SOIL SURVEY OF

Strafford County, New Hampshire

United States Department of Agriculture
Soil Conservation Service
In cooperation with
New Hampshire Agricultural Experiment Station

Issued March 1973

Major fieldwork for this soil survey was done in the period 1956–67. Soil names and descriptions were approved in 1968. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1967. This survey was made cooperatively by the Soil Conservation Service and the New Hampshire Agricultural Experiment Station. It is part of the technical assistance furnished to the Strafford County Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased on individual order from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Strafford County are shown on the detailed map at the back of this publication. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in this survey. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also gives the page number for each soil description.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those that have a moderate limitation can be colored yellow, and those that have a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions.

Foresters and others can refer to the subsection "Soils in Woodland Management," where the soils of the county are rated according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the subsection "Soils in Wildlife Management."

Community planners and others can read about soil properties that affect the choice of sites for nonindustrial buildings and recreational areas in the subsections "Soils in Community Development" and "Soils in Recreational Development."

Engineers and builders can find tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices in the subsection "Soils in Engineering."

Scientists and others can read about how the soils formed and how they are classified in the section "Formation, Morphology, and Classification of the Soils."

Newcomers in Strafford County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the sections "Additional Facts About the County," and "Climate."

Cover picture: **Aerial view of urban expansion in southern Strafford County. Areas of Buxton and Suffield soils are used for highways and for residential, commercial, and industrial development.**

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BY FRANK J. VIEIRA AND RICHARD W. BOND

FIELDWORK BY THEODORE L. KELSEY, RICHARD W. BOND, HARVEL E. WINKLEY, AND FRANK J. VIEIRA, SOIL CONSERVATION SERVICE [1]

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION

STRAFFORD COUNTY is in the southeastern part of New Hampshire (fig. 1). It occupies 249,090 acres or 389.2 square miles, of which 8,256 acres or 12.9 square miles is water. This is the smallest county in the State. Strafford County is bounded on the east by the State of Maine, on the north by Carroll County, on the south by Rockingham County, and on the west by Merrimack and Belknap Counties. It has 10 towns and 3 cities within its boundaries. Dover is the county seat and largest city. About 83 percent of the land area is forested.

This county is within two physiographic sections of the New England Province, the Seaboard Lowland and the New England Upland. Elevation ranges from sea level to 1,760 feet. The highest point is on Copple Crown Mountain in New Durham.

The economy of Strafford County is principally industrial. Dairying is the most important farm enterprise. Livestock, fruit, vegetables, and general farm products are also produced.

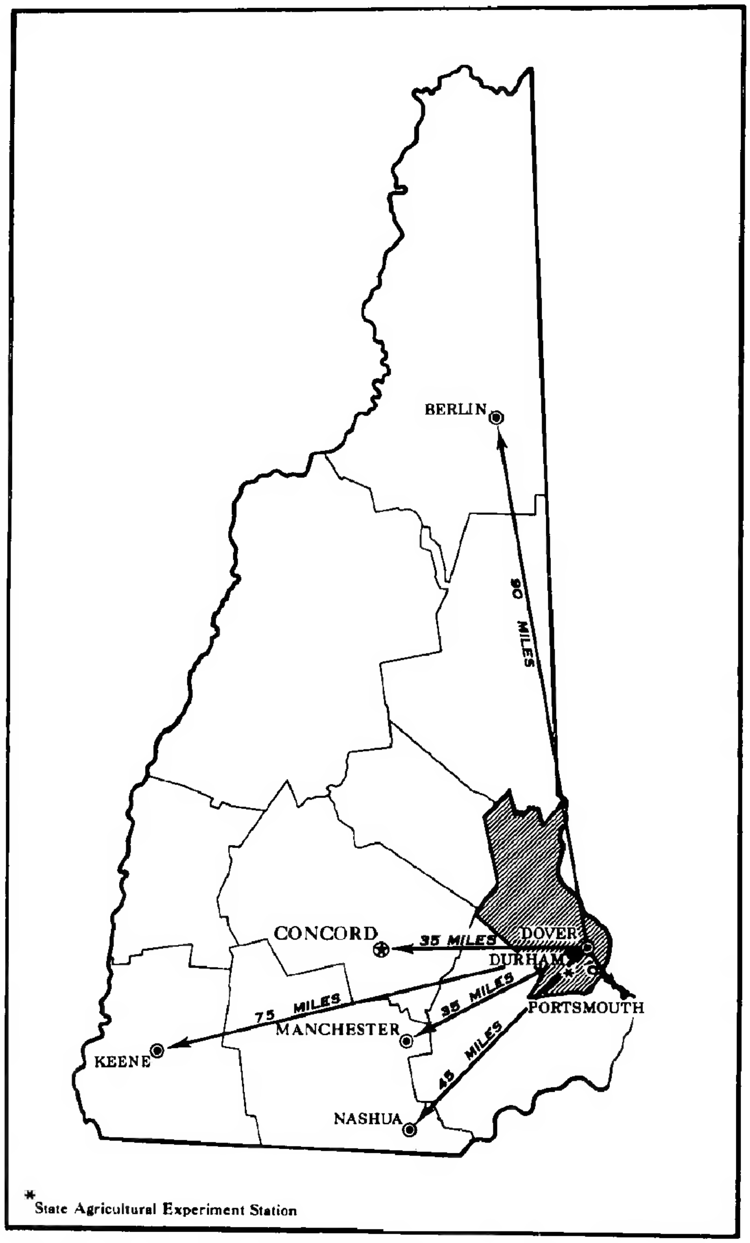

Figure 1.—Location of Strafford County in Hew Hampshire.

How This Survey Was Made

Soil scientists made this survey to determine what kinds of soil are in Strafford County, where they are located, and how they can be used. They went into the county expecting to find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons between the profiles they studied. They compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* (*21*)[2] are the categories of soil classification most used in a local survey.

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[1] Others participating in the fieldwork were CARL E. DELLINGER, WALTER W. DOUGLAS, HOWARD W. CARR, and LELAND H. GILE, JR.

[2] Italic numbers in parentheses refer to Literature Cited, p. 94.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Hinckley and Charlton, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the natural, undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Hinckley loamy sand, 0 to 3 percent slopes, is one of several phases within the Hinckley series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. One such kind of mapping unit shown on the soil map of Strafford County is the soil complex.

A soil complex consists of areas of two or more soils, so intermingled or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. The name of a soil complex consists of the names of the dominant soils joined by a hyphen. Hollis-Charlton fine sandy loams, 3 to 8 percent slopes, is an example.

In most areas surveyed, there are places where the soil material is so rocky, so shallow, or so severely eroded that it cannot be classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Made land is a land type in Strafford County.

Some soils have properties sufficiently different from other known soils to justify a new series name. They occupy geographic areas so limited in extent, however, that creation of a new series is not believed to be justified. These kinds of soil are called variants. Windsor loamy fine sand, clay subsoil variant, is the only such soil in Strafford County.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soil in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil. Yields under defined management are estimated for all the soils.

Only part of a soil survey is finished when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that is readily useful to different users, among them farmers, foresters, sportsmen, and engineers.

On the basis of yield and practice tables and other data, the soil scientists set up trial soil groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others, then adjust the groups according to the results of their studies and consultation. Groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Strafford County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

The boundaries and names of soil associations do not match well with those of general soil maps in recently published soil surveys for adjoining counties. The reason for this is that the change in concepts of soils has resulted in slightly different boundaries of delineations and names of soil associations.

A map showing soil associations is useful to those who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or other structure because soils within an association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The six soil associations in Strafford County are discussed in the following pages.

1. Gloucester-Hollis-Leicester association

Deep and shallow, somewhat excessively drained, hilly soils on uplands, and poorly drained soils in upland depressions

This association is on the hilly uplands, mostly in the western and northern parts of the county (fig. 2). Scattered throughout the uplands are low, swampy areas and a few lakes and ponds. Stones, boulders, and bed-

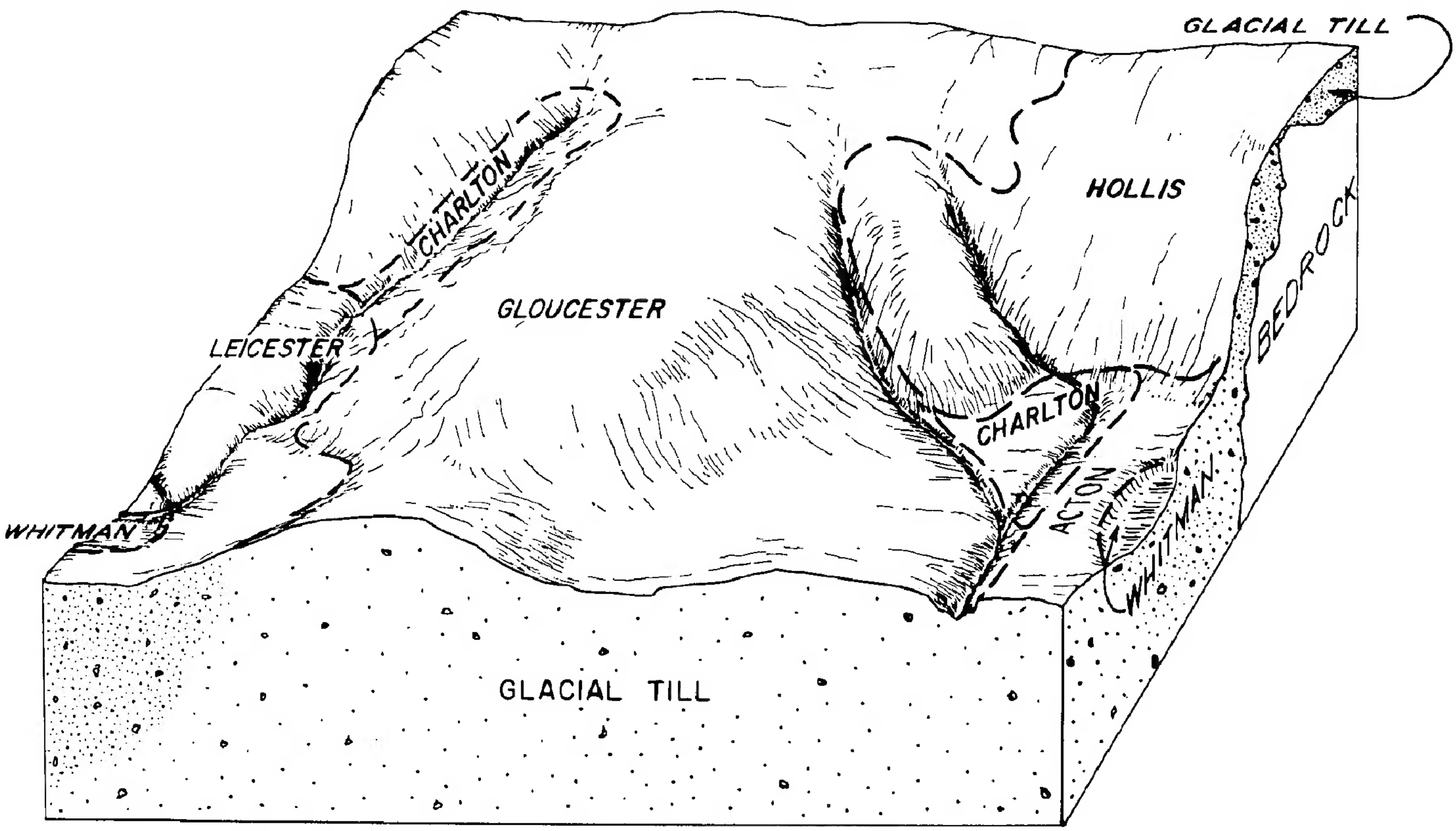

***Figure 2.*—Typical pattern of soils and underlying material in the Gloucester-Hollis-Leicester association.**

rock outcrops are prominent. About 95 percent of the association is forested. Elevation ranges from about 200 to 1,700 feet. This association makes up about 40 percent of the county.

Gloucester soils make up about 50 percent of the association. Hollis soils make up about 20 percent, and Leicester soils make up about 8 percent. The remaining 22 percent of the association is Acton, Charlton, and Whitman soils.

Gloucester soils are deep and somewhat excessively drained. They formed in stony, sandy glacial till and are commonly on stone-covered hillsides. The Hollis soils are seasonally droughty and are shallow to bedrock. Typically, they have stones on the surface and rock outcrops. They generally lie on hill crests. The Leicester soils are somewhat poorly drained and poorly drained. They formed in loamy glacial till and lie in upland depressions.

Stones on the surface, shallow depth to bedrock, rock outcrops, and steep slopes are major limitations to both farm and nonfarm uses. A few areas of less sloping Gloucester soils have been cleared of stones on the surface and are suitable for use as cropland. Wild lowbush blueberries are a cash crop on Teneriffe Mountain in Milton and near Blue Job Mountain in Farmington. Recreational development in the form of camping areas and lakeshore developments is becoming an important land use, especially at Merrymeeting Lake, Sunrise Lake, Swains Pond, and Mendums Pond.

2. *Paxton-Hollis-Woodbridge association*

Deep and shallow, dominantly well-drained and somewhat excessively drained soils on rounded hills of the uplands

This association is on forested, stony, oval-shaped or rounded hills, mostly in the central part of the county (fig. 3). About 85 percent of the association is forested. Elevation ranges from about 100 to 1,000 feet. This association makes up about 20 percent of the county.

Paxton soils make up about 30 percent of the association, Hollis soils about 20 percent, and Woodbridge soils about 12 percent. Soils of minor extent including those of the Ridgebury, Charlton, Gloucester, and Sutton series, make up the remaining 38 percent of the association.

The Paxton soils are well drained and are commonly on the side of smooth, rolling hills. They formed in loamy glacial till. A pan layer at a depth of about 2 feet hinders downward movement of water and restricts root growth. Hollis soils are shallow and somewhat excessively drained. They formed in less than 20 inches of glacial till over bedrock and are typically on ridges. Bedrock outcrops are common in most places. The Woodbridge soils are on broad, nearly level hilltops. They are moderately well drained and have a pan layer at a depth of 1½ to 3 feet. Water moves laterally over the pan and causes seep spots downslope.

Most areas of this association are forested, but some areas have been cleared and are used for hay and pas-

Figure 3.—**Typical landscape in the Paxton-Hollis-Woodbridge association in the central part of the county. Smooth, rounded hills are a prominent feature.**

ture. Steep slopes and stones on the surface are limitations to cultivation. Some of the best dairy farms in the county are in this association. The Paxton soils on the high hilltops are well suited to apple orchards.

Moderately slow permeability, seasonal wetness, shallow depth to bedrock, and bedrock outcrops are management concerns where the soils of this association are used for residential, industrial, and recreational development.

3. *Hinckley-Windsor-Saugatuck association*

Deep, excessively drained and poorly drained soils that formed in sand and gravel deposits on plains and terraces

This association is mostly on nearly level sand plains and terraces along the Salmon Falls and Cocheco Rivers in the eastern part of the county (fig. 4). The absence of stones, boulders, and bedrock outcrops is a noticeable feature of the landscape. Most of the association is forested. Elevation ranges from a few feet above sea level to about 500 feet. Rochester and Farmington are in this association. This association occupies about 14 percent of the county.

Hinckley soils make up about 40 percent of the association, Windsor soils about 28 percent, and Saugatuck soils about 10 percent. Small areas of Muck and peat, of Mixed alluvial land, wet, and of the Podunk, Rumney, and Deerfield soils make up the rest.

The sandy Hinckley soils are droughty and have layers of sand and gravel at a depth of about 18 inches. They are on mounds and plains. The sandy Windsor soils are also droughty but contain little or no gravel. They are mostly nearly level to gently sloping. The Saugatuck soils are sandy and are somewhat poorly drained and poorly drained. They have a strongly cemented pan in the upper part of the subsoil and are wet for 7 to 9 months of the year. They are in depressions and in low-lying flat areas.

The Hinckley and Windsor soils were once farmed but are now idle, are forested, or are used for community development. Droughtiness is a major limitation to crop production.

Most of the soils of this association have characteristics favorable for residential, industrial, and recreational uses. The Saugatuck soils are less suitable because of wetness. Generally, the Hinckley and Windsor soils have few limitations for such uses as building sites, septic tank sewage disposal systems, streets, and parking lots; however, there is danger of pollution from

subsurface sewage disposal systems. The Hinckley soils are a potential source of sand and gravel.

4. Hollis-Charlton-Buxton-Scantic association

Shallow and deep, somewhat excessively drained to well-drained, rolling soils on uplands and moderately well drained to poorly drained soils that formed in marine deposits of silt and clay

This association is on gently rolling hills or knolls interspersed with low, wet areas on the seacoast lowland in the southeastern part of the county (fig. 5). Bedrock outcrops are prominent features of the landscape, especially in the Durham Point area. About 50 percent of the association is forested. Elevation ranges from sea level to about 300 feet. This association makes up about 18 percent of the county.

Hollis soils make up about 40 percent of the association, Charlton soils about 20 percent, Buxton soils about 12 percent, and Scantic soils about 8 percent. Small spots of Muck and peat and areas of Suffield and Swanton soils make up the remaining 20 percent of the association.

The Hollis soils are shallow, somewhat excessively drained, and droughty. They generally formed in less than 20 inches of glacial till over bedrock. They occupy knolls and hilltops. The well-drained Charlton soils are mostly on side slopes. They formed in thick, stony glacial till. The undulating Buxton soils are moderately well drained to somewhat poorly drained and formed in silt and clay deposits. They are slowly permeable. The poorly drained, nearly level Scantic soils also formed in silts and clays and are slowly permeable.

The soils in this association are farmed very little because of rockiness and wetness. Forestry and wildlife habitat are suitable uses for the soils. Shallow depth to bedrock, rockiness, wetness, and slow permeability must be considered when planning residential, industrial, and recreational development. Failure to consider these limitations often results in septic tank sewage disposal problems, wet basements, and deterioration of paved road surfaces.

5. Charlton-Hollis-Scantic association

Deep and shallow, well-drained to somewhat excessively drained, rolling soils on uplands, and poorly drained soils that formed in marine deposits of silt and clay

This association is in the southern part of the county, mostly in the town of Lee. Stony, rocky, rolling hills are prominent features of the landscape. Except for Wednesday Hill, elevation is from 60 to 200 feet. About 80 percent of the association is forested. It makes up about 3 percent of the county.

The Charlton soils make up about 50 percent of the association, Hollis soils about 25 percent, and Scantic soils, about 8 percent. The remaining 17 percent is made up of spots of Deerfield, Elmwood, and Swanton soils.

Charlton soils are sloping to hilly, deep, and well drained. They formed in loamy glacial till. The shallow, somewhat droughty Hollis soils occupy knolls and hilltops. They formed in less than 20 inches of loamy

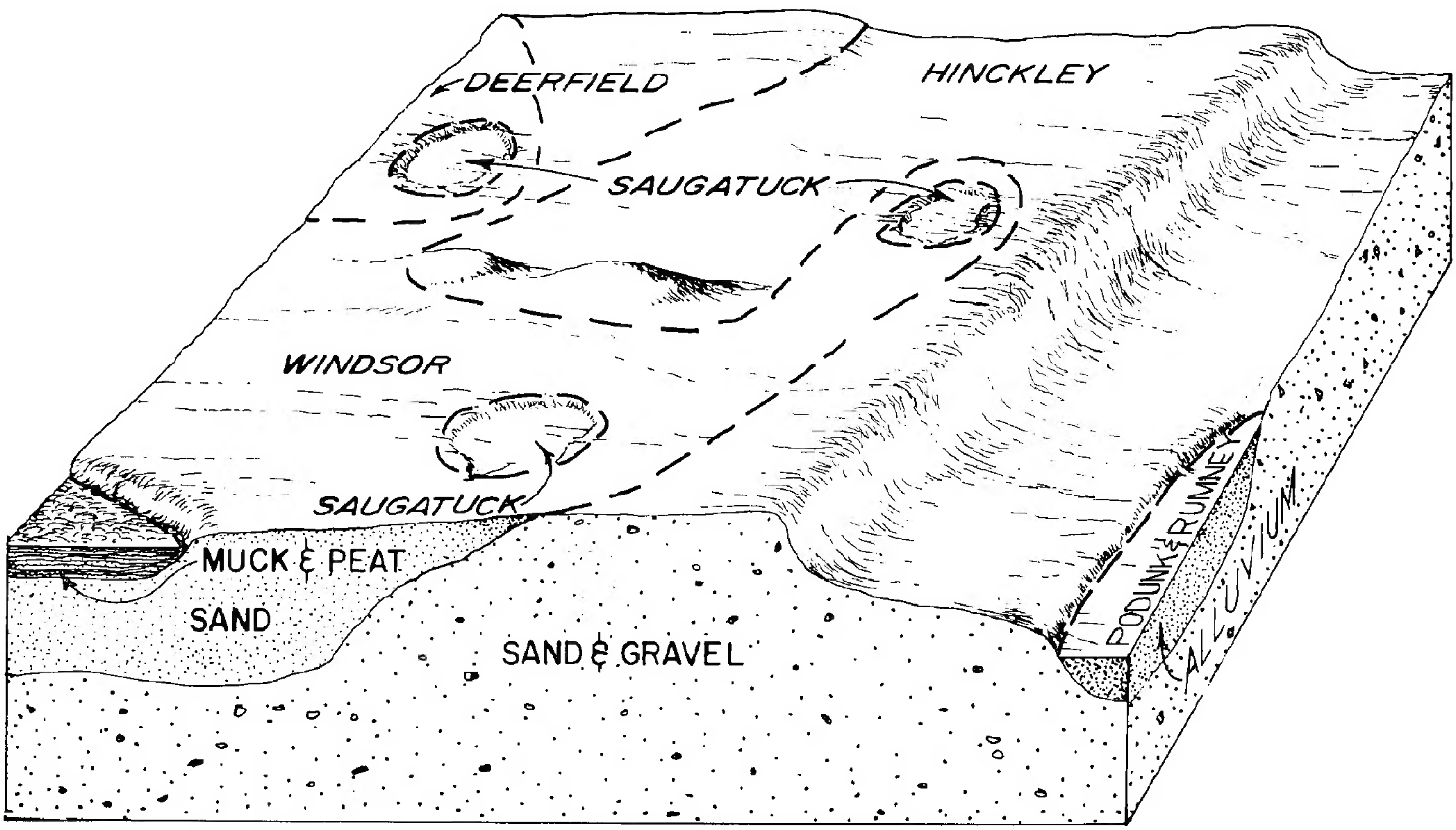

***Figure 4.*—Typical pattern of soils and underlying material in the Hinckley-Windsor-Saugatuck association.**

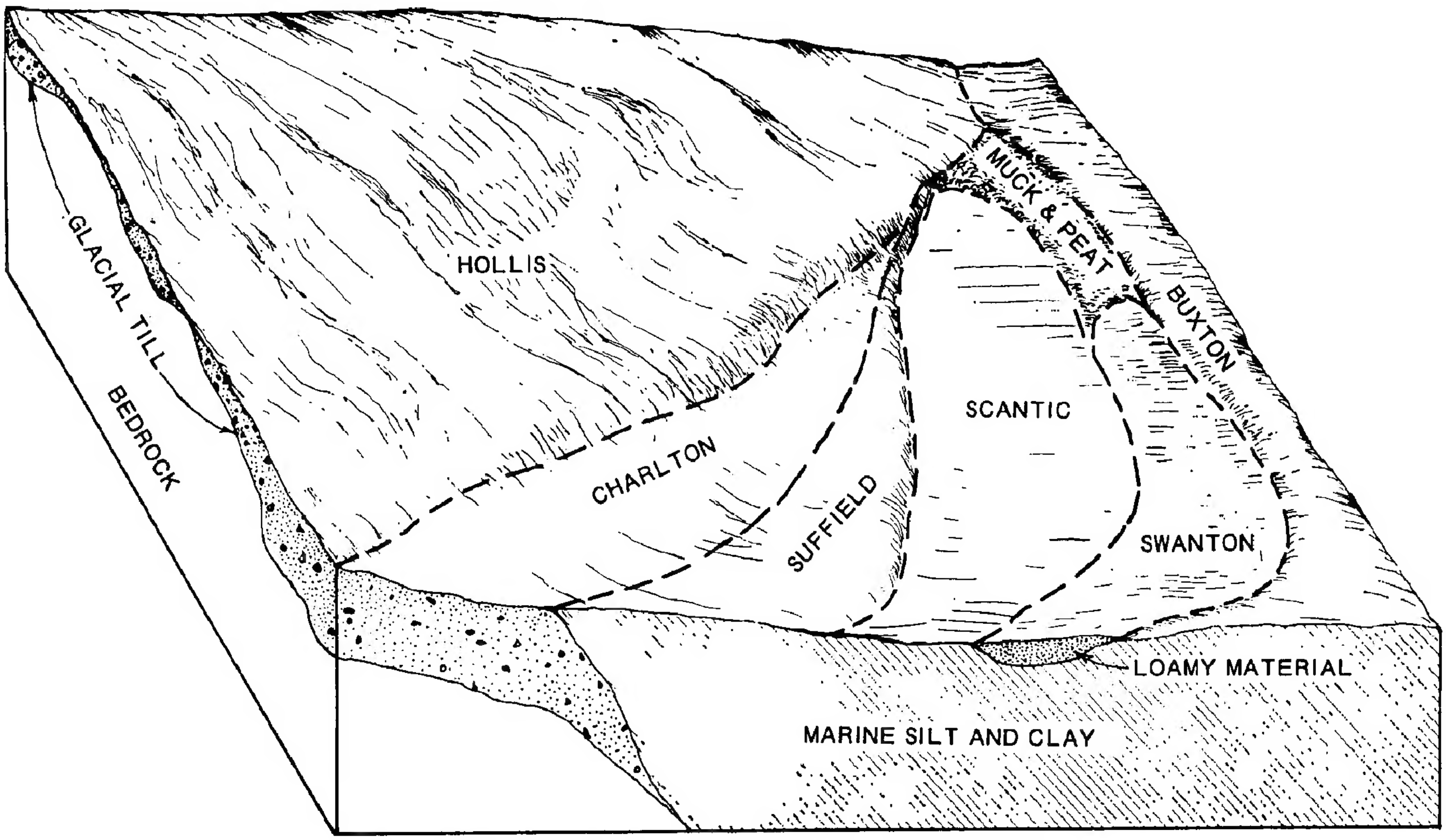

***Figure 5.*—Typical pattern of soils and underlying material in the Hollis-Charlton-Buxton-Scantic association.**

glacial till over bedrock. The Scantic soils have a clayey, slowly permeable substratum and are difficult to drain. They are in low-lying areas.

Most of the soils in this association were once farmed but have reverted to woodland. There are a few dairy farms. Stoniness, rockiness, and in some places wetness, are limitations to cultivation and to residential, industrial, and recreational uses. In some areas of the Hollis soils, the bedrock is rippable and is a lesser problem for most nonfarm uses. Forestry is a suitable use, but tree growth is generally limited by the shallowness to bedrock.

6. *Hollis-Gloucester association*

Shallow and deep, somewhat excessively drained, rocky and stony soils that occur mostly on low mountains

This association consists of areas that are steep, rocky, stony, and mountainous. It includes Blue Job Mountain, Parker Mountain, and parts of Copple Crown Mountain. About 95 percent of the association is forested. Elevation ranges from about 800 to 1,700 feet. This association makes up about 5 percent of the county.

Hollis soils are mostly on the ridges and make up about 70 percent of this association. Gloucester soils are on the lower slopes and make up about 20 percent. Scattered spots of Acton and Whitman soils and of Muck and peat make up the remaining 10 percent.

Hollis soils are steep, are somewhat excessively drained, and have less than 20 inches of glacial till over bedrock. Bedrock outcrops are common. Gloucester soils are deep, are somewhat excessively drained, and have many stones on and below the surface.

Most areas of the soils in this association are used as woodland, a use to which they are suited. Tree growth and the kinds of suitable trees are limited because of the shallowness to bedrock. Steep slopes, rockiness, and stoniness make this association unsuitable for farming, and they also severely limit use for residential, industrial, and recreational development. The soils of this association have good potential for skiing, hiking, hunting, and the development of scenic vistas.

Descriptions of the Soils

This section describes the soil series and mapping units. The approximate acreage and proportionate extent of each mapping unit are given in table 1.

The pages that follow give a general description of each soil series. Each series description contains a detailed description of a soil profile typical of the series and a brief statement of characteristics of the soils in the series as mapped in this county. Following the series description, each of the mapping units in the series is described. For full information on any one mapping unit, read the description of the soil series as well as the description of the mapping unit. Miscellaneous land types,

such as Gravel and borrow pits, are described in alphabetic order along with the soil series.

A symbol in parentheses follows the name of each mapping unit; it identifies the mapping unit on the detailed soil map. The capability classification of each mapping unit is indicated in parentheses at the end of each mapping unit description. Refer to the "Guide to Mapping Units" to find the page number for each mapping unit description.

The section "General Soil Map" gives additional general information about the soils. Many of the terms used in the soil descriptions and in other parts of the survey are defined in the Glossary and in the Soil Survey Manual (*20*).

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Acton fine sandy loam, 0 to 8 percent slopes	443	0.2
Acton very stony fine sandy loam, 0 to 8 percent slopes	2,024	.8
Acton very stony fine sandy loam, 8 to 15 percent slopes	1,015	.4
Biddeford silty clay loam	472	.2
Buxton silt loam, 0 to 3 percent slopes	204	(1)
Buxton silt loam, 3 to 8 percent slopes	4,669	1.9
Charlton fine sandy loam, 3 to 8 percent slopes	1,609	.7
Charlton fine sandy loam, 8 to 15 percent slopes	730	.3
Charlton fine sandy loam, 15 to 25 percent slopes	363	.2
Charlton very stony fine sandy loam, 3 to 8 percent slopes	3,820	1.6
Charlton very stony fine sandy loam, 8 to 15 percent slopes	6,684	2.8
Charlton very stony fine sandy loam, 15 to 25 percent slopes	4,564	1.9
Charlton extremely stony fine sandy loam, 8 to 25 percent slopes	7,368	3.1
Deerfield loamy sand, 0 to 3 percent slopes	1,406	.6
Deerfield loamy sand, 3 to 8 percent slopes	822	.3
Elmwood fine sandy loam, 0 to 3 percent slopes	318	.1
Elmwood fine sandy loam, 3 to 8 percent slopes	565	.2
Fresh water marsh	585	.2
Gloucester fine sandy loam, 3 to 8 percent slopes	1,264	.5
Gloucester fine sandy loam, 8 to 15 percent slopes	863	.4
Gloucester very stony fine sandy loam, 3 to 8 percent slopes	7,452	3.1
Gloucester very stony fine sandy loam, 8 to 15 percent slopes	15,552	6.5
Gloucester very stony fine sandy loam, 15 to 25 percent slopes	3,266	1.4
Gloucester very stony fine sandy loam, 25 to 60 percent slopes	1,136	.5
Gloucester extremely stony fine sandy loam, 8 to 25 percent slopes	18,398	6.8
Gloucester extremely stony fine sandy loam, 25 to 60 percent slopes	4,114	1.7
Gravel and borrow pits	390	.1
Hinckley loamy sand, 0 to 3 percent slopes	3,082	1.3
Hinckley loamy sand, 3 to 8 percent slopes	7,302	3.1
Hinckley loamy sand, 8 to 15 percent slopes	3,294	1.4
Hinckley gravelly loamy sand, 15 to 60 percent slopes	2,704	1.1
Hollis-Charlton fine sandy loams, 3 to 8 percent slopes	2,857	1.9
Hollis-Charlton fine sandy loams, 8 to 15 percent slopes	1,465	.6
Hollis-Charlton fine sandy loams, 15 to 25 percent slopes	344	.1
Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes	6,128	2.5
Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes	7,956	3.3
Hollis-Charlton very rocky fine sandy loams, 15 to 25 percent slopes	2,044	.8
Hollis-Charlton extremely rocky fine sandy loams, 8 to 25 percent slopes	8,140	3.5
Hollis-Charlton extremely rocky fine sandy loams, 25 to 60 percent slopes	2,886	1.2
Hollis-Gloucester fine sandy loams, 3 to 8 percent slopes	422	.2
Hollis-Gloucester fine sandy loams, 8 to 15 percent slopes	401	.2
Hollis-Gloucester very rocky fine sandy loams, 3 to 8 percent slopes	4,537	1.9
Hollis-Gloucester very rocky fine sandy loams, 8 to 15 percent slopes	6,426	2.7
Hollis-Gloucester very rocky fine sandy loams, 15 to 25 percent slopes	4,250	1.8
Hollis-Gloucester extremely rocky fine sandy loams, 8 to 25 percent slopes	8,182	3.5
Hollis-Gloucester extremely rocky fine sandy loams, 25 to 60 percent slopes	5,186	2.2
Leicester fine sandy loam, 0 to 8 percent slopes	392	.2
Leicester very stony fine sandy loam, 0 to 3 percent slopes	684	.3
Leicester very stony fine sandy loam, 3 to 8 percent slopes	1,658	.7
Leicester-Ridgebury very stony fine sandy loams, 0 to 3 percent slopes	2,874	1.2
Leicester-Ridgebury very stony fine sandy loams, 3 to 8 percent slopes	4,992	2.1
Made land	238	(1)
Mixed alluvial land, wet	881	.4
Muck and peat	7,490	3.1
Ondawa fine sandy loam	312	.1
Paxton fine sandy loam, 0 to 8 percent slopes	1,645	.7
Paxton fine sandy loam, 8 to 15 percent slopes	1,332	.6
Paxton fine sandy loam, 15 to 25 percent slopes	432	.2
Paxton very stony fine sandy loam, 3 to 8 percent slopes	2,864	1.2
Paxton very stony fine sandy loam, 8 to 15 percent slopes	5,780	2.4
Paxton very stony fine sandy loam, 15 to 25 percent slopes	1,996	.8
Paxton very stony fine sandy loam, 25 to 60 percent slopes	742	.3
Podunk fine sandy loam	349	.1
Ridgebury fine sandy loam, 0 to 3 percent slopes	369	.2
Ridgebury fine sandy loam, 3 to 8 percent slopes	355	.1
Ridgebury very stony fine sandy loam, 0 to 3 percent slopes	1,482	.6
Ridgebury very stony fine sandy loam, 3 to 8 percent slopes	2,196	.9
Rock outcrop	125	(1)
Rumney fine sandy loam	457	.2
Saugatuck loamy sand	5,388	2.2
Scantic silt loam, 0 to 3 percent slopes	3,529	1.5
Scantic silt loam, 3 to 8 percent slopes	826	.3
Suffield silt loam, 8 to 15 percent slopes	1,791	.7
Suffield silt loam, 15 to 35 percent slopes	333	.1
Suncook loamy sand	320	.1
Sutton fine sandy loam, 0 to 8 percent slopes	484	.2
Sutton very stony fine sandy loam, 0 to 8 percent slopes	1,478	.6
Swanton fine sandy loam, 0 to 3 percent slopes	1,115	.5

See footnotes at end of table.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Swanton fine sandy loam, 3 to 8 percent slopes	417	.2
Tidal marsh	536	.2
Whitman very stony fine sandy loam	2,022	.8
Windsor loamy sand, 0 to 3 percent slopes	2,296	1.0
Windsor loamy sand, 3 to 8 percent slopes	3,330	1.4
Windsor loamy sand, 8 to 15 percent slopes	762	.3
Windsor loamy sand, 15 to 60 percent slopes	1,186	.5
Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes	1,704	.7
Windsor loamy fine sand, clay subsoil variant, 8 to 15 percent slopes	415	.2
Woodbridge fine sandy loam, 0 to 8 percent slopes	1,527	.6
Woodbridge very stony fine sandy loam, 0 to 8 percent slopes	3,376	1.4
Woodbridge very stony fine sandy loam, 8 to 15 percent slopes	652	.3
Total land area [2]	240,834	100.0

[1] Less than 0.1 percent.

[2] Water area is 8,256 acres.

Acton Series

The Acton series consists of deep, moderately well drained soils that formed in stony, sandy glacial till. Stones and boulders are conspicuous on the surface in uncultivated areas and throughout the profile of these soils. Acton soils are most common in the western and northern parts of the county. They generally lie in depressions and on gently sloping to sloping foot slopes on uplands.

A representative profile in a cultivated area, where the surface stones have been removed, has a very dark grayish-brown fine sandy loam surface layer about 6 inches thick. The subsoil is mainly yellowish-brown and light yellowish-brown loamy sand that extends to a depth of 23 inches. Distinct mottles are common at a depth of more than 17 inches. Below the subsoil is mottled, grayish-brown loamy coarse sand. Stones and boulders are throughout the profile, and the lower layers are 10 to 15 percent gravel.

Acton soils have moderately rapid permeability and low available water capacity. They are among the best soils in the county for forestry use. A seasonal high water table and the abundance of stones and boulders limit these soils for most nonfarm uses.

Representative profile of Acton fine sandy loam (slope of 4 percent) in a cultivated area located three-fourths mile southwest of Middleton Corners in the town of Middleton (stones have been removed from the surface):

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; many fine roots; 2 to 5 percent gravel; strongly acid; abrupt, smooth boundary.

B21—6 to 13 inches, yellowish-brown (10YR 5/4) loamy sand; weak, fine, granular structure; very friable; common roots; 3 to 5 percent gravel; strongly acid; clear, wavy boundary.

B22—13 to 17 inches, light yellowish-brown (10YR 6/4) loamy sand; weak, fine, granular structure; very friable; few roots; 8 to 10 percent gravel; some stones; medium acid; clear, wavy boundary.

B23—17 to 21 inches, yellowish-brown (10YR 5/6) loamy sand; common, medium, distinct, yellowish-red (5YR 4/8) mottles; massive; very friable; few roots; 8 to 10 percent gravel; some stones; medium acid; clear, wavy boundary.

B3—21 to 23 inches, light olive-brown (2.5Y 5/4) loamy sand; many, medium, distinct, red (2.5YR 4/8) mottles; massive; very friable; 10 to 15 percent gravel; some cobblestones and stones; medium acid; clear, wavy boundary.

Cg—23 to 42 inches, grayish-brown (2.5Y 5/2) loamy coarse sand; few, fine, faint, strong-brown (7.5YR 5/8) mottles; massive; very friable; 10 to 15 percent gravel; some cobblestones and stones; medium acid.

Texture of the A horizon is fine sandy loam or sandy loam. The B horizon ranges from fine sandy loam to loamy coarse sand. The B21 horizon has a hue of 7.5YR or 10YR and a chroma and value of 4 to 6. The B22 horizon has a hue of 10YR or 2.5Y, a value of 4 to 6, and a chroma of 3 to 6. The C horizon is loamy sand, loamy coarse sand, or sand that has a high content of coarse sand. This horizon ranges from 10YR to 5Y in hue, from 4 to 7 in value, and from 2 to 4 in chroma. Consistence of the C horizon is friable to loose. The weighted average of all coarse fragments in the profile, including stones, is more than 35 percent by volume. Depth to distinct mottling ranges from 12 to 30 inches.

Acton soils are near and closely resemble the better drained Gloucester soils. Acton soils are of the same drainage class as Woodbridge soils, but they have a coarser textured C horizon and lack the distinct fragipan of the Woodbridge soils. Acton and Deerfield soils are also of the same drainage class, but Acton soils have a finer textured A horizon and contain more coarse fragments, including cobblestones and stones, throughout the profile.

Acton fine sandy loam, 0 to 8 percent slopes (AcB).—This soil characteristically lies in depressions and on lower side slopes of upland hills. It has the profile described as representative for the series.

Included in mapping are a few small areas of soils that have a weakly developed pan layer about 2 to 3 feet below the surface. Some areas of stone-free Acton soils that have slopes steeper than 8 percent and small areas of poorly drained Leicester soils are also included.

Seasonal wetness is a major limitation; artificial drainage generally improves most areas for cropping and nonfarm uses. Erosion is a hazard where the surface layer has been cultivated or disturbed during construction work.

This soil is suited to corn, small grain, grasses, and legumes. The long slopes in the gently sloping areas can be cropped continuously if this soil is drained and protected from erosion by the use of diversions and by stripcropping. Cropping systems generally include row crops, cover crops, and grasses and legumes in a rotation. Legumes grown on this soil are subject to damage by seasonal wetness.

Artificial drainage increases the choice of crops and allows earlier tillage. Most stones have been removed

from the surface, but in places stones below the surface interfere with tillage. Protection from grazing is advisable early in spring or whenever the soil is wet.

Most areas of this soil are in perennial hay, some areas are forested, and a few spots are used for residential, industrial, and recreational development. A good potential exists for the development of open-land wildlife habitat. (Capability unit IIw-52)

Acton very stony fine sandy loam, 0 to 8 percent slopes (AdB).—This is a rolling soil that typically lies in depressions on uplands. The profile is similar to that described as representative for the series, but in most places it has a thinner and darker colored surface layer. Stones on the surface are commonly 5 to 30 feet apart.

Included in mapping are small areas of poorly drained Leicester soils. In places there are soils that have a weak pan layer at a depth of about 2 to 3 feet. Also included are spots of soils where stones on the surface are less than 5 feet apart.

A seasonal high water table and stones on the surface are limitations to hay and row crop production, community development, and some recreational uses, but artificial drainage and stone removal can improve the soil for these uses.

Most of this soil is forested, a use to which it is well suited. In past years many areas were used for permanent pasture. This soil has a fair potential for woodland wildlife habitat. Wet spots are potential pond sites. (Capability unit VIs-72)

Acton very stony fine sandy loam, 8 to 15 percent slopes (AdC).—This soil has long, wooded, concave slopes and is on uplands. The profile of this soil is similar to that described as representative for the series, but it generally has a thinner and darker colored surface layer and more cobblestones. Stones on the surface are about 5 to 30 feet apart.

Included in mapping are extremely stony areas and areas of very stony Gloucester soils. In some places there are soils that have a weak pan layer in the substratum.

Seasonal wetness and stones on the surface are severe limitations for hay and row crop production. They are also major limitations where this soil is used for residential and industrial development. Slopes and stones on the surface hinder artificial drainage. Erosion is generally a minor hazard unless stones on the surface and vegetation are removed.

Most of this soil is forested, a use to which it is well suited. This soil provides fair habitat for woodland wildlife. (Capability unit VIs-72)

Biddeford Series

The Biddeford series consists of very poorly drained soils that formed in thick silt and clay sediments of marine origin. These soils lie in depressional areas on lowlands in the southeastern part of the county. Vegetation is mostly alder, willow, and cattails.

A representative profile of a Biddeford soil in grass has a surface layer of black silty clay loam 7 inches thick. The subsoil, about 19 inches thick, is mottled, dark-gray silty clay in the upper 8 inches and mottled, dark greenish-gray silty clay in the lower part. Below this, to a depth of about 41 inches, is greenish-gray silty clay.

These soils are saturated and have a high water table most of the year. Ponding often occurs. Permeability is slow. Wetness makes the Biddeford soils unsuitable for cropping and is a major limitation for most other uses.

Representative profile of Biddeford silty clay loam (slope of 1 percent) in a hayfield 450 yards southeast of the junction of Middle Road and Court Street in Dover:

Ap—0 to 7 inches, black (10YR 2/1) silty clay loam (10YR 5/1 when dry and crushed); moderate, medium, granular structure; friable; many roots; medium acid; clear, wavy boundary.

B21g—7 to 15 inches, dark-gray (5Y 4/1) silty clay; common, fine, distinct, dark yellowish-brown (10YR 4/4) mottles around root channels; weak, fine, subangular blocky structure; firm; few roots; clay films on ped faces; medium acid; clear, wavy boundary.

B22g—15 to 26 inches, dark greenish-gray (5GY 4/1) silty clay; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, coarse, prismatic structure breaking to moderate, medium, blocky structure; firm; plastic; clay films on ped faces; medium acid; clear, wavy boundary.

Cg—26 to 41 inches, greenish-gray (5GY 5/1) silty clay; few, fine, distinct, yellowish-brown (10YR 5/6) mottles; massive; very firm; plastic; medium acid.

The texture of the Ap or A1 horizon is generally silt loam or silty clay loam, and in places it is mucky. The B and C horizons range from silty clay loam to clay. Clay content is as much as 60 percent. Chroma of the B and C horizons is 0 to 1. Mottles are few or are absent in the horizon just below the A1 or Ap horizon, except where root channels occur. The C horizon ranges from medium acid to neutral.

Biddeford soils formed in materials similar to those in which the Buxton and Scantic soils formed. They are more poorly drained and have a darker colored and typically a finer textured A horizon than soils of the Buxton or Scantic series.

Biddeford silty clay loam (Be).—This nearly level, very poorly drained soil lies in depressions, mostly in the seacoast lowlands.

Included in mapping are small areas of very poorly drained soils that consist of 18 to 40 inches of loamy material over silt and clay deposits. Also included are areas of Scantic soils and spots of shallow, organic soils.

Improving drainage is the major need in management, but it is difficult because water moves slowly through the subsoil. Open ditches and bedding are generally the best means of draining this soil.

This soil is not suited to cultivated crops. Drained areas are suited to water-tolerant grasses grown for hay. Most areas are in forest or unimproved pasture, and some are idle. Woodland and unimproved pasture are suitable uses. Good sites exist for the development of wetland and woodland wildlife habitat. (Capability unit VIw-34)

Buxton Series

The Buxton series consists of deep, moderately well drained to somewhat poorly drained soils that formed in silt and clay marine deposits. These soils are level to gently sloping and lie on low knolls in the southeastern part of the county. At some former time, these soils were plowed.

A representative profile of a Buxton soil in a forested area has a layer of fresh and partially decayed leaves and twigs about 1½ inches thick overlying a dark-brown

silt loam mineral surface layer about 3 inches thick. The upper part of the subsoil is yellowish-brown silt loam 7 inches thick, and the lower part of the subsoil is light olive-brown silty clay loam 3 inches thick. The next series of layers is about 30 inches thick. In sequence from the top, the upper 5 inches is mottled grayish-brown light silty clay loam. The next 10 inches is olive-gray silty clay loam that contains many distinct mottles. The lower 15 inches is mottled, olive silty clay.

Buxton soils have slow permeability and high available water capacity. Seasonal wetness and slow permeability are limitations to use for community development. These soils are generally well suited to farming and timber production.

Representative profile of a Buxton silt loam (slope of 6 percent) in a forested area in Durham, College Woods, four-tenths mile southwest of junction of U.S. Route 4 and Mast Road:

O1—1½ inches to 1 inch, fresh leaf litter.
O2—1 inch to 0, partially decomposed needles and twigs.
Ap—0 to 3 inches, dark-brown (10YR 3/3) silt loam; weak, fine and medium, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary.
B21—3 to 10 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, granular structure; friable; common roots; strongly acid; clear, wavy boundary.
B22—10 to 13 inches, light olive-brown (2.5Y 5/4) light silty clay loam; weak, medium, granular structure; friable; common roots; strongly acid; abrupt, wavy boundary.
A'2—13 to 18 inches, grayish-brown (2.5Y 5/2) light silty clay loam; common, fine, distinct, strong-brown (7.5YR 5/6) mottles; moderate, medium, granular structure; friable; few roots; strongly acid; abrupt, wavy boundary.
IIB'21g—18 to 28 inches, olive-gray (5Y 5/2) silty clay loam; many, medium, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, prismatic structure breaking to moderate, fine and medium, angular blocky structure; firm; few roots; common silt or clay films in fine pores and channels; few black manganeselike stains on ped faces; medium acid; clear, wavy boundary.
IIB'22g—28 to 43 inches, olive (5Y 5/3) silty clay with olive-gray (5Y 5/2) clay coatings on peds; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, angular blocky structure; firm; common silt or clay films in pores and channels; few black manganeselike stains on ped faces; slightly acid.

Texture of the A horizon is mainly silt loam or loam. Structure ranges from weak, fine, granular to moderate, medium, granular. Texture in the upper part of the B horizon ranges from silt loam to light silty clay loam. Hue is 10YR or 2.5Y, and the range of value and chroma is from 3 to 5. Structure ranges from weak and moderate, fine and medium, granular to weak, fine and medium, subangular blocky.

Texture of the IIB' horizon is silty clay loam or silty clay. This horizon has a hue of 2.5Y or 5Y, a value of 4 or 5, and a chroma of 2 to 4. The structure is coarse, prismatic, fine and medium, angular blocky or thin platy. Depth to mottling ranges from 12 to 24 inches. Consistence is firm to very firm. The upper part of the profile ranges from strongly acid to slightly acid; the lower part is medium acid to neutral.

Buxton soils in Strafford County differ from Buxton soils in other survey areas. In Strafford County the B2 horizon contains a considerable accumulation of iron and organic matter. Usefulness and behavior of the soils, however, is not affected by this difference.

Buxton soils are near Suffield, Elmwood, and Scantic soils. Buxton and Suffield soils formed in similar material, but the Buxton soils are mottled at a depth of 1 to 2 feet. Buxton and Elmwood soils are of the same drainage class, but Buxton soils have finer textures in the upper part of the profile. Buxton and Scantic soils formed in similar materials, but Buxton soils are better drained.

Buxton silt loam, 0 to 3 percent slopes (BzA).—This soil is in slight depressions in the seacoast lowlands. It is less susceptible to erosion and is wet for slightly longer periods than Buxton silt loam, 3 to 8 percent slopes.

Included in mapping are some areas of soils that have a fine and very fine sandy loam surface layer. Also included are areas of poorly drained Scantic soils in depressions. Schist and phyllite fragments that are gravel-size but flat in shape occur throughout the soil in areas adjacent to Hollis soils where bedrock is close to the surface.

Wetness is the major limitation on this soil. It is difficult to work early in spring when it is wet and in midsummer when it is dry. It is well suited to hay and pasture crops. It is also suited to silage corn and truck crops if it is drained. Drainage measures include tile drains, surface field ditches, and land smoothing. Tile drainage is generally required in areas used extensively for truck crops. Relatively close spacing of tile drains is needed for effective drainage because of the slowly permeable subsoil.

Cropping systems may include row crops, cover crops, and grasses and legumes in rotation. If legumes are grown, they should be varieties resistant to wetness, winterkill, and damage by frost heaving.

Most areas of this soil are forested or are used for hay crops, but some areas near urban centers are used for residential and industrial site development. Serious problems often result from these nonfarm uses, however, when the limitations of the soils are not considered. (Capability unit IIw–32)

Buxton silt loam, 3 to 8 percent slopes (BzB).—This soil lies on low knolls in the otherwise relatively level seaboard lowlands. Individual areas range in size from 5 acres to more than 20 acres. It has the profile described as representative for the series. Near areas of Hollis soils where bedrock is close to the surface, isolated rock outcrops occur and flat, gravel-size schists and phyllite fragments are scattered throughout the profile.

Included in mapping are areas of Elmwood soils and areas of soils that have a fine sandy loam and very fine sandy loam surface layer.

Seasonal wetness and slow permeability are major limitations on this soil. It is subject to erosion when disturbed by cultivation or during construction work. Workability is a problem because it has a relatively high silt and clay content in the surface layer and in the subsoil.

This soil is well suited to hay and pasture crops. It is also suited to silage corn and truck crops if it is drained. Drainage measures include tile drains, surface field ditches, and land smoothing. When the soil is used extensively for row crops, diversions and stripcropping may be needed to control erosion. These practices are used in cropping systems that include cover crops and grasses and legumes in the rotation. If legumes are grown, they should be varieties resistant to wetness, winterkill, and damage by frost heaving.

Tile drainage is generally required in areas that are used extensively for truck crops. Because of the slowly permeable subsoil, relatively close spacing of tile drains is needed to provide effective drainage.

Most areas of this soil are forested or are used for hay, but many areas are used for residential and industrial development. Failure to recognize soil limitations often results in serious problems with these nonfarm uses. (Capability unit IIw-32)

Charlton Series

The Charlton series consists of well-drained loamy soils that formed in thick, stony glacial till. Typically, they are on hill crests and on upper convex side slopes throughout the county where slopes range from 3 to 25 percent. Stones on the surface are common.

A representative profile of a Charlton soil in a cultivated area has a dark-brown fine sandy loam surface layer 8 inches thick overlying a yellowish-brown fine sandy loam subsoil about 28 inches thick. The underlying material to a depth of 40 inches is a light olive-brown loamy fine sand.

Charlton soils have moderate permeability and moderate available water capacity. The more nearly level, stone-free areas are well suited to most farm and nonfarm uses, including woodcrops.

Representative profile of a Charlton fine sandy loam (slope of 4 percent) in a cultivated area 250 yards southwest of the junction of Clark Road and Route 202A in Rochester:

Ap—0 to 8 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; very friable; many roots; 3 to 5 percent gravel-size fragments; strongly acid; abrupt, smooth boundary.

B21—8 to 13 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, fine, granular structure; very friable; common roots; 10 to 15 percent gravel-size fragments; medium acid; clear, wavy boundary.

B22—13 to 22 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; friable; common roots; 10 to 15 percent gravel-size fragments; medium acid; clear, wavy boundary.

B23—22 to 36 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; firm; few roots; 8 to 10 percent gravel-size fragments; medium acid; clear, wavy boundary.

C—36 to 40 inches, light olive-brown (2.5Y 5/4) loamy fine sand; massive; firm in place, friable when removed; 8 to 10 percent gravel-size fragments; some cobblestones and stones; medium acid.

The A horizon is mainly fine sandy loam or loam. The Ap horizon is 10YR in hue, 3 or 4 in value, and 2 or 3 in chroma. Texture of the B horizon ranges from sandy loam to fine sandy loam. The B21 and B22 horizons are in hues of 10YR and 7.5YR and are from 4 to 6 in value and chroma. The C horizon ranges from sandy loam to fine sandy loam, but thin layers of loamy sand are common in some places. Hue is 10YR, 2.5Y, or 5Y. The C horizon is commonly massive, but in some places it has a weak, fine, granular structure or weak to moderate, thick, platy structure. Consistence in friable to firm.

Charlton soils are near Hollis, Sutton, and Gloucester soils. Charlton and Hollis soils formed in similar material, but Charlton soils are deeper to bedrock. Charlton and Sutton soils also formed in similar materials, but Charlton soils are better drained. Charlton soils are finer textured than Gloucester soils at a depth below 14 inches, and they contain less coarse fragments, including cobblestones and stones, in the lower part of the profile.

Charlton fine sandy loam, 3 to 8 percent slopes (CfB).—This soil commonly occupies hill crests in individual areas that are 3 to 10 acres in size. It has the profile described as representative for the series.

Included in mapping are a few small areas of Hollis soils and of moderately well drained Sutton soils, and some nearly level areas of Charlton soils. Also included are some areas of soils in which the subsoil is yellowish red to strong brown. Areas of soils that contain soft, highly weathered gravel and cobblestone-size, calcareous schist fragments throughout the profile are common inclusions in the town of Lee. The inclusions of Hollis soils are more common in the southeastern part of the county.

Crops respond well to the application of fertilizer and to other management practices. A few cobblestones and stones in the profile make this soil more difficult to work.

Most of this soil is used for hay and pasture. It is well suited to apple orchards, corn, small grains, grasses, or legumes. It can be used for row crops continuously if it is tilled on the contour or stripcropped. These practices are needed to control erosion, and they are also used in cropping systems that include row crops, cover crops, and grasses and legumes in the rotation. (Capability unit IIe-5)

Charlton fine sandy loam, 8 to 15 percent slopes (CfC).—This soil commonly occupies hillsides in individual areas that are generally 3 to 10 acres in size. It has a profile similar to that described as representative for the series, but erosion has made the surface layer thinner.

Included in mapping are a few areas of Hollis and Sutton soils and some areas that have a yellowish-red to strong-brown subsoil. Areas of soils that have soft, highly weathered gravel and cobblestone-size, calcareous schist fragments throughout the profile are common inclusions in the town of Lee.

Most of this soil is used for hay and pasture. It is better suited to hay and pasture than to row crops because of slope and the hazard of erosion, but apples, corn, small grain, grasses, and legumes grow well on it. When this soil is used for row crops, erosion control practices are necessary. These practices include contour farming, stripcropping, and diversions, as well as grasses and legumes grown in rotation. A few stones beneath the surface interfere with tillage. (Capability unit IIIe-5)

Charlton fine sandy loam, 15 to 25 percent slopes (CfD).—This soil commonly occupies long, narrow side slopes of hills on uplands in areas 5 to 10 acres in size. Some of the original surface layer has been eroded, but otherwise the profile is similar to that described as representative for the series.

Included in mapping are a few small areas of Hollis soils, areas of soils in which the subsoil is yellowish red to strong brown, and some more steeply sloping areas of Charlton soils. Also included are areas of soils, mostly in the town of Lee, that have soft, highly weathered gravel and cobblestone-size, calcareous schist fragments.

Most of this soil is forested, but some of it is used for hay and pasture. Apple orchards, grasses, and legumes are also suited. Because of the hazard of erosion and the moderately steep slopes, this soil is better suited to hay and pasture crops than to row crops. When used for row crops, intensive erosion control measures are needed. A cropping system that holds soil losses to a minimum should be selected. The system requires cover crops and grasses and legumes in the rotation. Erosion control practices generally include contour farming,

stripcropping, and diversions. Areas used for hay and pasture should be reseeded in strips. The steeper slopes are difficult to work safely using tractor-drawn equipment. Stones beneath the surface interfere with tillage. (Capability unit IVe-5)

Charlton very stony fine sandy loam, 3 to 8 percent slopes (CsB).—This soil typically lies on hill crests in areas that are 3 to 100 acres in size. It has a profile similar to that described as representative for the series, but the mineral surface layer is thinner and darker colored. Stones on the surface are generally 1 to 2 feet in diameter and 5 to 30 feet apart.

Included in mapping are small areas of Hollis and Sutton soils and some areas of soils that have a yellowish-red or strong-brown subsoil. Also included are some nearly level areas of Charlton soils and areas of soils, mostly in the town of Lee, that have a subsoil and substratum that contain soft, highly weathered, gravel and cobblestone-size, calcareous schist fragments.

This soil is not suited to row crops, because of stones on the surface. If the stones are removed, it is suited to field and truck crops. Some areas are suited to pasture, but most of the areas are woodland. In addition to use for timber, this soil can be used for woodland wildlife habitat and for recreational development. (Capability unit VIs-7)

Charlton very stony fine sandy loam, 8 to 15 percent slopes (CsC).—This soil lies on hillsides in areas that are 20 to 150 acres in size. It has a profile similar to that described as representative for the series, but the mineral surface layer is thinner and darker colored. Stones on the surface are 1 to 2 feet in diameter and 5 to 30 feet apart.

Included in mapping are small areas of Hollis and Sutton soils and areas of soils that have a yellowish-red to strong-brown subsoil. Hollis soils and areas of soils that contain highly weathered rock fragments throughout the profile are common inclusions in the southern part of the county.

Most areas of this soil are in forest, but some areas are in pasture or are idle. A small acreage is used for commercial production of blueberries. Stoniness makes this soil unsuited to hay or row crops. Unprotected slopes are subject to erosion. The soil is best suited to forestry or pasture. The development of woodland wildlife habitat is also a suitable use. (Capability unit VIs-7)

Charlton very stony fine sandy loam, 15 to 25 percent slopes (CsD).—This soil occupies hillsides. It has a profile similar to that described as representative for the series, but the surface layer is thinner and darker colored. Surface stones are 1 to 2 feet in diameter and 5 to 30 feet apart.

Included in mapping are a few spots of Hollis soils, areas of soils that have a yellowish-red to strong-brown subsoil, and areas of more steeply sloping Charlton soils. Areas of soils that contain highly weathered, calcareous schist fragments are common inclusions in the town of Lee.

Stoniness and moderately steep slopes are major limitations for most uses of this soil. It is dominantly woodland, a use to which it is well suited, but timber harvesting operations are difficult on the steeper slopes. A small acreage is used for commercial production of blueberries. This soil has potential for the development of woodland wildlife habitat. (Capability unit VIs-7)

Charlton extremely stony fine sandy loam, 8 to 25 percent slopes (CvD).—This rolling soil generally lies in broad areas on uplands, and individual areas are 40 to 175 acres in size. It has a profile similar to that described as representative for the series, but it has a darker colored surface layer and more cobblestones and stones throughout the profile. Stones on the surface are so numerous that one can step from stone to stone.

Included in the mapping are areas of Hollis and Sutton soils and areas of soils in which the subsoil is yellowish red to strong brown. A few spots of rock outcrop are also included.

Most areas of this soil are forested. Small, scattered areas have been cleared of trees and are in unimproved pasture or are idle. Stoniness and moderately steep slopes are major limitations to both farm and nonfarm uses. This soil is best suited to forestry and woodland wildlife habitat. In some places boulders hinder logging operations. (Capability unit VIIs-58)

Deerfield Series

The Deerfield series consists of moderately well drained soils that formed in thick deposits of water-sorted sands. These soils commonly lie on terraces near streams and rivers throughout the county. They are mainly in small areas on sand plains and have slopes of 0 to 8 percent.

A representative profile of a Deerfield soil in a cultivated area has a very dark brown loamy sand surface layer about 9 inches thick. The upper 7 inches of the subsoil is yellowish-brown loamy sand. Below this, to a depth of 29 inches, the subsoil is brownish-yellow medium sand and contains strong-brown mottles. To a depth of 40 inches, the underlying material is light yellowish-brown sand of medium and fine size and contains red mottles.

Deerfield soils have moderately rapid permeability and low available water capacity. Seasonal wetness is a major limitation. These soils are well suited to most species of woodcrops, and the potential for development of openland and woodland wildlife habitat is good.

Representative profile of a Deerfield loamy sand (slope of 1 percent) in a cultivated area 400 yards south of New Durham town hall on east side of road:

Ap—0 to 9 inches, very dark brown (10YR 2/2) loamy sand; weak, fine, granular structure; very friable; many fine roots; medium acid; abrupt, wavy boundary.

B21—9 to 16 inches, yellowish-brown (10YR 5/6) loamy sand; massive; friable; common fine roots; medium acid; clear, wavy boundary.

B22—16 to 29 inches, brownish-yellow (10YR 6/6) medium sand containing common, medium, distinct, strong-brown (7.5YR 5/8) mottles; single grain; loose; few fine roots; medium acid; clear, wavy boundary.

C—29 to 40 inches, light yellowish-brown (10YR 6/4) medium and fine sand containing many, coarse, prominent, red (2.5YR 4/6) mottles; single grain; loose; medium acid.

Texture of the A horizon is generally loamy sand or loamy fine sand. Texture of the B horizon ranges from loamy fine sand to sand. Hue in the upper part of the B horizon is 7.5YR or 10YR, value is 4 or 5, and chroma is 3 to 6. The C horizon is generally sand, but stratified gravel occurs in places at a depth below 30 inches. The size of sand in the

C horizon ranges from the lower limit of medium through fine. In the C horizon, hue ranges from 5Y to 10YR, value is from 3 to 6, and chroma is from 1 to 4. Depth to distinct mottling ranges from 12 to 30 inches.

Deerfield soils and the nearby Windsor and Saugatuck soils formed in similar sandy materials. Deerfield soils are similar to Windsor soils but have mottles beginning at a depth of 1 to 2½ feet. Deerfield soils are better drained than Saugatuck soils and lack the strongly cemented B horizon.

Deerfield loamy sand, 0 to 3 percent slopes (DeA).—This soil lies in long, narrow and short, irregularly shaped areas. It has the profile described as representative for the series. The water table is at a depth between 12 and 30 inches during wet seasons.

Included in mapping are small areas of soils that have a coarse sand and gravelly substratum. Also included are areas of somewhat poorly drained to poorly drained Saugatuck soils, areas of soils that have a yellow and reddish-yellow substratum, and some areas of soils that have a fine sandy loam surface layer.

Seasonal wetness is a limitation to most farm and nonfarm uses. This soil is suited to corn and truck crops, but artificial drainage is necessary. Artificial drainage is feasible for some cropping and community development uses. This soil has to be worked later in spring than most well-drained soils. Tile drainage is commonly used to allow earlier tillage and a wider choice of crops.

In undrained areas the choice of crops is restricted, and cultivation is delayed in spring. If legumes are grown, they should be the kind that can tolerate seasonal wetness. Drained areas can be used for row crops continuously if a winter cover crop is grown. Since this soil has low available water capacity, irrigation is necessary during dry periods to insure satisfactory growth of shallow-rooted crops. Cropping systems should include row crops, cover crops, and grasses and legumes in the rotation.

Most of this soil is forested, but some of it is in hay or pasture. There is generally no significant limitation to the use of this soil if it is drained. (Capability unit IIIw–22)

Deerfield loamy sand, 3 to 8 percent slopes (DeB).—This soil commonly lies in areas on side slopes of depressions in sand plains. The water table is typically at a depth of 18 to 30 inches early in spring.

Included in mapping are some areas of gravelly soils and some small areas of Windsor soils. Also included are areas of soils that have a yellow and reddish-yellow substratum.

Seasonal wetness is a limitation for many uses of this soil, but artificial drainage can improve it for some cropping and community development uses. Outlets for drainage systems are generally easily obtained. A seasonal high water table restricts the choice of crops and delays cultivation in spring. If artificial drainage is used, this soil is suited to corn and truck crops. If legumes are grown, they should be of a kind that can tolerate seasonal wetness.

In areas that have long slopes, erosion is a hazard. Graded strips improve drainage and control erosion. This practice is used in cropping systems that include row crops, cover crops, and grasses and legumes in the rotation. Because this soil has low available water capacity, irrigation is necessary during dry periods to insure satisfactory growth of shallow-rooted crops. (Capability unit IIIw–22)

Elmwood Series

The Elmwood series consists of moderately well drained soils that formed in more than 18 inches and less than 40 inches of loamy material and underlying thick silt and clay deposits, mostly of marine origin. These are nearly level to gently sloping soils on plains in the southeastern part of the county.

A representative profile of an Elmwood soil in a cultivated area has a very dark grayish-brown fine sandy loam surface layer about 8 inches thick. The upper part of the subsoil is yellowish-brown fine sandy loam 8 inches thick. The lower part of the subsoil is mottled, light olive-brown loamy fine sand 4 inches thick. The next series of layers totals about 23 inches. In sequence from the top, the upper 2 inches is mottled, olive-brown light silt loam. The next 5 inches is mottled, olive light silty clay loam, and the lower 16 inches is mottled, olive-gray silty clay loam.

Elmwood soils have moderately slow permeability and moderate available water capacity. Sewage filter fields do not function well, because of a seasonal high water table and because the soils have moderately slow permeability. These soils are well suited to woodcrops.

Representative profile of an Elmwood fine sandy loam (slope of 5 percent) in a cultivated area one-fourth mile east of Leehook Road, 150 yards west of Durham-Lee town line:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; medium acid; abrupt, smooth boundary.

B21—8 to 16 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, very fine, granular structure; very friable; common roots; medium acid; gradual, wavy boundary.

B22—16 to 20 inches, light olive-brown (2.5Y 5/4) loamy fine sand containing few, fine, distinct, strong-brown (7.5YR 5/6) mottles in lower 3 inches; weak, fine, granular structure; friable; common roots; strongly acid; clear, wavy boundary.

IIA'2—20 to 22 inches, olive-brown (2.5Y 4/4) light silt loam; grayish-brown (2.5Y 5/2) clay coatings on peds; common, medium, distinct, red (2.5YR 5/6) mottles; moderate, fine, angular blocky structure; clean sand grains on ped faces; firm; few roots; strongly acid; clear, wavy boundary.

IIB'2—22 to 27 inches, olive (5Y 5/3) light silty clay loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; strong, medium, angular blocky structure; very firm; few thin silt or clay films on vertical ped faces; some manganeselike stains on ped faces; strongly acid; clear, wavy boundary.

IIC—27 to 43 inches, olive-gray (5Y 5/2) silty clay loam; many, medium, distinct, yellowish-red (5YR 5/6) and reddish-brown (2.5YR 4/4) mottles; massive; very firm; few thin silt or clay films in old root channels; manganeselike stains on walls of pores and root channels; strongly acid.

The texture of the A and B21 horizons is fine sandy loam or sandy loam. The B21 horizon has a hue of 7.5YR, 10YR, or 2.5Y; a value of 3 to 5; and a chroma of 3 to 6. Texture of the IIB and IIC horizons is mainly silty clay loam but is silty clay in places. The IIB'2 horizon has a hue of 5Y, 2.5Y, and 10YR. Depth to underlying silt and clay deposits ranges from more than 18 inches to less than 40 inches. The depth

to distinct or prominent mottles ranges from about 1½ to 2½ feet. Reaction of the solum ranges from strongly acid to medium acid; the underlying moderately fine and fine material ranges from strongly acid to neutral.

Elmwood soils are near Windsor soils, clay subsoil variant, and Scantic soils. They closely resemble Windsor soils, clay subsoil variant, but are finer textured in the A horizon and in the upper part of the B horizon and contain mottles below a depth of about 1½ to 2½ feet. The Elmwood soils are coarser textured in the upper part of the profile and are better drained than Scantic soils.

Elmwood fine sandy loam, 0 to 3 percent slopes (EaA).—This soil lies in small areas 5 to 10 acres in size, mostly on the gently rolling coastal lowlands of the county. It is less susceptible to erosion and is slightly wetter than Elmwood fine sandy loam, 3 to 8 percent slopes. The water table is at a depth between 15 and 30 inches during wet seasons.

Included in mapping are areas of poorly drained Swanton soils, areas of moderately well drained soils that are very fine sandy loam and silt loam throughout the profile, areas of poorly drained soils formed in deep sands, and spots of Deerfield soils.

Seasonal wetness and a moderately slowly permeable substratum are limitations for most uses. Improving drainage is the major need in management.

This soil is suited to row crops, small grains, hay, and pasture. Cropping systems commonly include grasses and legumes in the rotation. Cover crops are also used after row crops.

This soil is mostly forested, but some of it is used for hay and pasture. Improving subsurface drainage improves this soil for most farm and nonfarm uses. (Capability unit IIw-42)

Elmwood fine sandy loam, 3 to 8 percent slopes (EaB).—This soil commonly is in small areas 5 to 10 acres in size. It has the profile described as representative for the series. The water table is at a depth between 16 and 30 inches early in spring.

Included in mapping are spots of Deerfield soils, small areas of poorly drained soils, and areas of moderately well drained soils that are very fine sandy loam and silt loam throughout the profile. Depth to silty and clayey layers is 16 to 20 inches in soils in the Pudding Hill area of Madbury and Dover.

Excessive seasonal wetness and a substratum that has moderately slow permeability are limitations to many uses of this soil. Improving drainage is the major need in management.

This soil is suited to row crops, hay, and pasture. It can be cropped continuously if it is drained and erosion is controlled. Erosion control practices include diversions, contour farming, and stripcropping. Cropping systems generally include grasses and legumes in the rotation. Cover crops are also used after row crops.

Most areas of this soil are forested, but some areas are used for hay and pasture. Improving subsurface drainage improves this soil for most farm and nonfarm uses. (Capability unit IIw-42)

Fresh Water Marsh

Fresh water marsh (Fa) consists of areas covered by shallow water most of the time. It occurs around the edge of lakes and ponds and in depressions that contain water much of the year (fig. 6). Vegetation is mainly grasses, reeds, sedges, cattails, and rushes. This land type is too wet for trees.

Fresh water marsh has no value for tilled crops or pasture but does provide a very important habitat for wetland wildlife. The habitat can be improved in some places by controlling the water level. (Capability unit VIIIw-89)

Gloucester Series

The Gloucester series consists of somewhat excessively drained soils that formed in thick, stony, sandy glacial till. Stones on the surface are a prominent feature of these soils. The Gloucester soils are most common on hilly uplands in the western and northern parts of the county. They are commonly gently sloping to very steep and occur on convex slopes.

A representative profile of a Gloucester soil in a plowed area has a dark-brown fine sandy loam surface layer about 8 inches thick. The subsoil is about 20 inches thick. It is yellowish-brown fine sandy loam in the upper 6 inches, yellowish-brown loamy sand in the next 6 inches, and light olive-brown loamy sand in the lower 8 inches. Below this, to a depth of about 40 inches, the underlying material is light brownish-gray, loose, gravelly medium and coarse sand that contains many cobblestones and stones.

Gloucester soils have moderately rapid permeability and low available water capacity. Stones and boulders on and below the surface are limitations to many uses of these soils. The potential for tree growth is good.

Representative profile of a Gloucester fine sandy loam (slope of 7 percent) in hayfield on north side of road in New Durham, one-half mile west of New Durham-Middleton town line on road between New Durham Corner and Middleton Corners:

Ap—0 to 8 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; very friable; many roots; 5 percent gravel; strongly acid; abrupt, wavy boundary.

B21—8 to 14 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, medium, granular structure; very fri-

Figure 6.—**Typical area of Fresh water marsh. This land type is important as habitat for many kinds of wetland wildlife.**

able; common roots; 5 percent gravel and many cobblestones; few stones; very strongly acid; clear, wavy boundary.

B22—14 to 20 inches, yellowish-brown (10YR 5/4) loamy sand; weak, medium, granular structure; very friable; few roots; 5 to 15 percent gravel and cobblestones; some stones; very strongly acid; clear, wavy boundary.

B3—20 to 28 inches, light olive-brown (2.5Y 5/4) loamy sand; weak, fine, granular structure; slightly firm in place, friable when removed; few roots; 5 to 15 percent gravel and cobblestones; some stones; very strongly acid; clear, wavy boundary.

C—28 to 40 inches, light brownish-gray (2.5Y 6/2) gravelly coarse and medium sand; single grain; loose; 20 to 30 percent gravel; many cobblestones and stones; very strongly acid.

Texture of the A and B21 horizons is commonly fine sandy loam or sandy loam. The B horizon has a hue of 7.5YR or 10YR in the upper part and ranges to 2.5Y in the lower part. Value and chroma are generally from 4 to 6, but chroma is 3 in the B3 horizon in places. Texture of the B22 and B3 horizons is loamy sand or loamy coarse sand. The C horizon ranges from loamy sand to sand that is high in coarse and very coarse sand. The C horizon in some places contains thin, discontinuous layers or pockets that are firm or very firm. The weighted average of all coarse fragments, including stones, in the profile is more than 35 percent by volume. The greatest amount is in the C horizon.

Gloucester soils are near the Acton, Hollis, and Paxton soils. Gloucester and Acton soils formed in similar material, but Gloucester soils are better drained. Gloucester soils are deeper to bedrock and typically are coarser textured in the B horizon than Hollis soils. Gloucester soils are coarser textured in the lower part of the B horizon and in the C horizon and lack the fragipan characteristic of Paxton soils.

Gloucester fine sandy loam, 3 to 8 percent slopes (GlB).—This soil is in cleared fields on the uplands in areas 5 to 20 acres in size. It has the profile described as representative for the series.

Included in mapping are pockets of Acton and Hollis soils, less sloping areas of Gloucester soils, areas of soils that have a weak pan layer, and scattered spots of very stony Gloucester soils.

Diversions and stripcropping are needed in some places to control erosion if this soil is used for cultivated crops. These practices may also be needed in cropping systems that include cover crops and grasses and legumes in a rotation. Adding manure and returning crop residue to the soil is necessary to maintain tilth, provide additional organic matter, and conserve moisture. Stones and cobblestones in the profile interfere with tillage in some places.

This soil is suited to truck crops, apple orchards, corn, small grains, grasses, and legumes. Some crops require irrigation for optimum growth.

This soil is used mainly for hay and pasture, but some of it is forested. It is suited to most cultivated crops, but careful management is generally required to build up and maintain fertility. (Capability unit IIs–55)

Gloucester fine sandy loam, 8 to 15 percent slopes (GlC).—This soil is in cleared fields 5 to 20 acres in size on the upland hills of the county. It has a profile similar to that described as representative for the series, but the surface layer is thinner because of erosion.

Included in mapping are areas of Acton and Hollis soils, isolated areas of soils that have a weak pan layer, scattered spots of very stony Gloucester soils, and some small areas of soils that have 15 to 25 percent slopes.

Erosion control is the main need in management. Where this soil is disturbed by plowing or by construction work, erosion control practices are needed.

This soil is suited to silage corn, apple orchards, small grain, and deep-rooted grasses and legumes. Because of the erosion hazard, use of the soil for row crops is limited. When this soil is used for row crops, a cropping system that includes grasses and legumes in the rotation helps to keep soil losses to a minimum. Supporting erosion control practices are contour farming, stripcropping, and diversions. Some crops require irrigation for optimum growth. Adding manure and returning crop residue to the soil help to maintain tilth, provide additional organic matter, and conserve moisture. A few stones in the profile interfere with tillage in some places.

Most of this soil is in hay or pasture, but some of it is forested or is idle. Except for the erosion hazard and slope, this soil has few limitations for most nonfarm uses. (Capability unit IIIe–55)

Gloucester very stony fine sandy loam, 3 to 8 percent slopes (GsB).—This soil lies in broad, wooded areas on upland hills. The areas are from 10 acres to more than 100 acres in size. This soil has a profile similar to that described as representative for the series, but it has a darker colored mineral surface layer. Stones on the surface are 1 to 2 feet in diameter and 5 to 30 feet apart.

Included in mapping are areas of Acton and Hollis soils; areas of soils that are reddish-brown to yellowish-red in the upper part of the subsoil, which are common in the northern part of the county; and small, less sloping areas of Gloucester soils.

Because of stoniness, this soil is not suitable for cultivation. It is largely in forest, a use to which it is well suited. Some areas are used for pasture or are idle. Stone removal is the major limitation for community and recreational development. This soil can be used for the development of woodland wildlife habitat and for woodcrop production. (Capability unit VIs–7)

Gloucester very stony fine sandy loam, 8 to 15 percent slopes (GsC).—This soil lies in broad, wooded areas on upland hills, mostly in the northern part of the county. Individual areas are 10 acres to more than 300 acres in size. This soil has a profile similar to that described as representative for the series, but the mineral surface layer is darker colored and is a few inches thinner. Stones on the surface are 1 to 2 feet in diameter and are 5 to 30 feet apart. Boulders are in some areas, especially in the town of New Durham. Stones and cobblestones are throughout the soil profile.

Included in mapping are pockets of Acton soils, spots of Hollis soils, and areas of soils in which the upper part of the subsoil is reddish brown to yellowish red.

This soil is not suited to cultivated crops, because of surface stoniness. Unprotected slopes are subject to erosion.

Most areas of this soil are forested, a use to which it is well suited. Some areas are used as pasture or are idle. A small acreage is used for commercial production of blueberries. Development of woodland wildlife habitat is a suitable use. Stone removal and erosion control are the major needs of management for most uses. (Capability unit VIs–7)

Gloucester very stony fine sandy loam, 15 to 25 percent slopes (GsD).—This soil occupies wooded hillsides on

uplands and is in areas that are 20 to 200 acres or more in size. It has a profile similar to that described as representative for the series, but the mineral surface layer is generally thinner and darker colored. Stones on the surface are 1 to 2 feet in diameter and 5 to 30 feet apart. Boulders are on the surface in some areas, especially in the town of New Durham.

Included in mapping are areas of Hollis soils and areas of soils in which the upper part of the subsoil is reddish brown to yellowish red.

Stones on the surface and moderately steep slopes are major limitations for most uses. Unprotected areas are subject to erosion.

Most areas of this soil are forested. A few scattered areas are in unimproved pasture. This soil is not suited to cultivated crops. Forestry and woodland wildlife habitat development are suitable uses. (Capability unit VIs-7)

Gloucester very stony fine sandy loam, 25 to 60 percent slopes (GsE).—This steep soil commonly occupies the wooded upland hillsides in the northern part of the county. It has a profile similar to that described as representative for the series, but the mineral surface layer is thinner and darker colored. Stones on the surface are commonly 5 to 30 feet apart. Boulders are on the surface in some areas.

Included in mapping are areas of Hollis soils and areas of soils in which the upper part of the subsoil is reddish brown to yellowish red.

Because of steep slopes and stoniness, it generally is not feasible to clear this soil for uses other than forestry. Timber harvesting operations are difficult on the steeper slopes, and the hazard of erosion is severe if the protective vegetation is removed. Some slopes that have a northern exposure have good potential for the development of ski areas. (Capability unit VIIs-7)

Gloucester extremely stony fine sandy loam, 8 to 25 percent slopes (GtD).—This soil occupies hilly uplands in the northern part of the county and is in areas that are generally greater than 200 acres in size. It has a profile similar to that described as representative for the series, but the mineral surface layer is thinner and darker colored and there are more cobblestones and stones throughout the profile. Stones on the surface are commonly less than 5 feet apart. Boulders are on the surface in some areas.

Included in mapping are areas of Acton soils on more gentle slopes, areas of Hollis soils, areas of soils in which the upper part of the subsoil is reddish brown to yellowish red, and spots of Rock outcrop.

This soil is too stony for hay or other crops; it is therefore better suited to forestry or woodland wildlife. The many stones on the surface, boulders, and moderately steep slopes are major concerns of management. Harvesting of timber is difficult because of the surface stones and boulders. In many places logging is feasible only when the snow is deep. (Capability unit VIIs-58)

Gloucester extremely stony fine sandy loam, 25 to 60 percent slopes (GtE).—This soil occupies the rough, hilly, and mountainous parts of the county. Individual areas are 20 acres to more than 300 acres in size. The profile of this soil is similar to that described as representative for the series, but the mineral surface layer is thinner and darker colored and there are more cobblestones and stones throughout the profile. Stones on the surface are generally less than 5 feet apart. Boulders are on the surface in some areas.

Included in mapping are areas of Hollis soils, areas of soils in which the upper part of the subsoil is reddish brown to yellowish red, and scattered spots of Rock outcrop.

The steep slopes, the many stones on the surface, and the boulders generally prevent use of this soil for purposes other than forestry. Cleared areas are subject to severe erosion.

Most areas of this soil are used for forestry, but timber harvesting operations are difficult. Some areas that have a northern exposure can be developed for skiing, but access is poor and road construction is difficult. (Capability unit VIIs-58)

Gravel and Borrow Pits

Gravel and borrow pits (Gv) are open excavations from which gravel, sand, clay, and other materials have been removed. Typically, these excavations are located on plains, on terraces, and along streams (fig. 7). Fresh pits are commonly adjacent to new highways. The largest pit in the county is on Pudding Hill in the town of Madbury. A few are in upland till areas. Small pits are shown on the soil map by a symbol. (Not assigned to a capability unit)

Hinckley Series

The Hinckley series consists of excessively drained soils that formed in thick deposits of stratified sand and gravel. Cobblestones are common in some layers. These nearly level to very steep soils are on kames, terraces, and outwash plains throughout the county.

A representative profile of a Hinckley soil in a plowed area has a dark-brown loamy sand surface layer 10 inches thick overlying a yellowish-brown loamy sand and gravelly loamy sand subsoil that extends to a depth of about 20 inches. Below this, the underlying material to a depth of about 40 inches is loose yellowish-brown to brownish-yellow very gravelly sand.

Figure 7.—**Gravel pit in a Hinckley loamy sand, typically located on outwash plains.**

Permeability of these soils is rapid, and available water capacity is very low. Hinckley soils have few limitations for most nonfarm uses. There is danger of contamination of wells and streams from subsurface sewage disposal systems or sanitary landfill operations. Many areas of Hinckley soils are a source of sand and gravel for construction work.

Representative profile of a Hinckley loamy sand (slope of 5 percent) in a plowed area in Madbury, one-fourth mile west of Madbury-Dover town line on Pudding Hill Road:

Ap—0 to 10 inches, dark-brown (10YR 3/3) loamy sand, (10YR 6/4 when dry and crushed); weak, fine, granular structure; very friable; many roots; strongly acid; abrupt, smooth boundary.

B21—10 to 16 inches, yellowish-brown (10YR 5/6) loamy sand; weak, fine, granular structure; very friable; common roots; 10 to 15 percent gravel; very strongly acid; abrupt, wavy boundary.

B22—16 to 20 inches, yellowish-brown (10YR 5/6) gravelly loamy sand; weak, fine, granular structure; very friable; few roots; 35 percent gravel; very strongly acid; abrupt, wavy boundary.

C1—20 to 28 inches, yellowish-brown (10YR 5/6) very gravelly sand; single grain; loose; few roots; 60 percent gravel and cobblestones; very strongly acid; clear, wavy boundary.

C2—28 to 40 inches, brownish-yellow (10YR 6/6) very gravelly sand; single grain; loose; 60 percent gravel and cobblestones; medium acid.

The A horizon is loamy sand or sandy loam. The Ap horizon is dark brown and very dark grayish brown. Structure is weak, fine, granular or single grain. Consistence is very friable or loose. The B horizon ranges from loamy sand to sand in the upper part and is gravelly loamy sand to gravelly sand in the lower part. Cobblestones and gravel make up 10 to 40 percent of the solum by volume. The upper part of the B horizon is 7.5YR or 10YR in hue, 3 to 5 in value, and 4 to 8 in chroma. The lower part of the B horizon ranges from 3 to 5 in value and from 4 to 6 in chroma. Structure of the B horizon is weak, fine, granular or single grain, and consistence is very friable or loose. The C horizon is made up of layered sands and gravel or cobblestones. Coarse fragments larger than 2 millimeters make up 35 to 85 percent of the horizon by volume. Hue is 10YR or 2.5Y, value is 4 to 8, and chroma is 2 to 6.

Hinckley soils are near sandy Windsor, Deerfield, and Saugatuck soils. They contain more gravel throughout the profile than those soils and are better drained than Deerfield or Saugatuck soils. Hinckley soils lack the strongly cemented B horizon of Saugatuck soils.

Hinckley loamy sand, 0 to 3 percent slopes (HaA).—This soil lies in areas on plains and on tops of terraces. It has a profile similar to that described as representative for the series, but the depth to stratified sands and gravel is greater.

Included in mapping are areas of soils that are yellowish red to strong brown throughout the subsoil. Also included are areas of moderately well drained soils that formed in sands and gravel and, in some parts of the county, small areas of Windsor soils and small scattered spots of Hinckley soils that have a very stony surface layer.

Droughtiness and low natural fertility are limitations of this soil. It warms early in spring and is generally easy to till. However, gravel and cobbblestones in the surface layer in some areas make cultivation impractical.

This soil has limited suitability for row crops, hay, or pasture. Irrigation and extensive fertilization are needed for most crops. Cropping systems generally include cover crops, grasses, and legumes in the rotation. Adding manure and returning crop residue to the soil maintain the organic-matter content of the soil.

Most areas of this soil are forested, but a few are idle. Many areas are used for residential and industrial development. (Capability unit IIIs-26)

Hinckley loamy sand, 3 to 8 percent slopes (HaB).—This soil commonly occupies plains and terraces. It has the profile described as representative for the series.

Included in mapping are areas of soils that have a yellowish-red to strong-brown subsoil, areas of moderately well drained soils that formed in sands and gravel, small areas of Windsor soils, and small spots of very stony soils that have a profile similar to that of the Hinckley soils.

Droughtiness and low natural fertility are limitations to farming. This soil holds so little moisture that irrigation is necessary if crops are grown. This soil warms early in spring and is generally easy to work. Gravel and cobblestones in the surface layer are a limitation to cultivation in some areas. Erosion is a hazard where this soil is clean cultivated.

Cropping systems generally include cover crops, grasses, and legumes in the rotation. Where there are long slopes, stripcropping helps to conserve moisture and to minimize soil losses. Adding manure and returning crop residue to the soil help to maintain the organic-matter content of this soil.

Most areas of this soil are forested, some are idle, and some are used for nonfarm purposes. It is not well suited to hay or row crop production. Residential and industrial use is increasing in some areas. (Capability unit IIIs-26)

Hinckley loamy sand, 8 to 15 percent slopes (HaC).—This undulating soil typically occupies short, irregular slopes on terraces. It has a profile similar to that described as representative for the series, but the surface layer is thinner and layers of stratified sands and gravel are closer to the surface. This is an extremely droughty soil that is low in natural fertility and organic-matter content.

Included in mapping are areas of sandy Windsor soils and areas of soils that have a yellowish-red to strong-brown subsoil. Also included are some small spots of very stony soils that have a profile similar to that of the Hinckley soils.

Droughtiness and erosion hazard are limitations to crop production. Sufficient water for production of general farm crops, hay, or pasture is seldom available. Gravel and cobblestones in the surface layer of some areas of this soil are a limitation to cultivation.

This soil is better suited to drought-resistant grasses and legumes than to row crops. Irrigation is needed for most crops. When this soil is used for row crops, a cropping system should be selected that holds soil losses to a minimum. Contour farming, stripcropping, using diversions, and including cover crops and grasses and legumes in the rotation help to control erosion.

Adding manure and returning crop residue to the soil help to maintain the organic-matter content of this soil. Nutrients leach from this soil rapidly; therefore, frequent applications of lime and fertilizer are necessary.

Most areas of this soil are scrubby forest or are idle. It is not well suited to cultivation. It is suited to adapted trees, and it has some limited potential for grazing or for woodland wildlife habitat. There is some demand for this soil for use in residential development. (Capability unit IVs–26)

Hinckley gravelly loamy sand, 15 to 60 percent slopes (HbE).—This steep soil lies in areas on terrace breaks adjacent to streams and on kames and eskers. It has a profile similar to that described as representative for the series, but the surface layer is thinner and the surface layer and subsoil have a higher content of gravel.

Included in mapping are areas of soils that have a yellowish-red to strong-brown subsoil. Areas of sandy Windsor soils are also included.

Most of this soil is forested. It is too droughty, erodible, low in fertility, and steep for row or hay crops. It is also too steep for residential and industrial development. Much of this soil is covered with timber of poor quality and by low-growing shrubs that provide the necessary cover to control erosion. (Capability unit VIIs–27)

Hollis Series

The Hollis series consists of shallow, somewhat excessively drained soils that formed in a thin mantle of loamy glacial till. These soils are less than 20 inches deep over bedrock. Rock outcrops are a prominent feature of the landscape. Hollis soils are scattered throughout the county and do not occur in a characteristic pattern. They occupy both smooth and irregular hilltops throughout the county and are on knolls in the seacoast lowlands. Slope ranges from about 3 to 60 percent. In Strafford County Hollis soils are mapped in complexes with Charlton soils and with Gloucester soils.

A representative profile of a Hollis soil in a forested area has a layer of fresh and partially decayed leaves and needles 2 inches thick overlying a dark-brown fine sandy loam mineral surface layer 6 inches thick. The subsoil, to a depth of about 14 inches, is yellowish-brown fine sandy loam that contains some gravel. Unweathered quartzite bedrock is at a depth below 14 inches.

Hollis soils have moderate permeability above the bedrock and moderate available water capacity. As these soils thaw in spring, water flows underground over the bedrock and appears at the surface as seep spots. Shallow depth to bedrock is a limitation for many uses. Woodcrop productivity is fair to good.

Representative profile of a Hollis fine sandy loam (slope of 10 percent) in a forested area of Hollis-Charlton fine sandy loams, 8 to 15 percent slopes, 650 feet west of junction of State Route 202 and Pond Hill Road, 330 feet south of road in the town of Barrington:

O1—2 inches to 1 inch, recent accumulation of leaves and conifer needles.

O2—1 inch to 0, partially decomposed leaves and needles containing many fungal hyphae.

Ap—0 to 6 inches, dark-brown (10YR 3/3) fine sandy loam (value is 5.5 when dry and crushed); weak, fine, granular structure; very friable; many roots; strongly acid; abrupt, wavy boundary.

B2—6 to 14 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, fine, granular structure; very friable; common roots; 10 to 15 percent subangular coarse fragments 1 to 3 inches in size; strongly acid; abrupt, smooth boundary.

R—14 inches, unweathered quartzite bedrock.

The A horizon is generally fine sandy loam but ranges from loam to sandy loam. It is 10YR in hue and is 2 or 3 in value and chroma. The B horizon is fine sandy loam or sandy loam. Hue is 10YR or 7.5YR, value is 4 to 6, and chroma is 4 to 8. Consistence is friable or very friable. Depth to bedrock ranges from about 10 to 20 inches.

Hollis soils are near Charlton and Gloucester soils. Hollis and Charlton soils formed in similar material. Hollis soils are shallower to bedrock than Charlton and Gloucester soils, and they typically are finer textured in the B horizon than Gloucester soils.

Hollis-Charlton fine sandy loams, 3 to 8 percent slopes (HcB).—This complex consists of shallow Hollis soils and deep Charlton soils. These soils mainly occupy cleared fields on the seacoast lowlands and the central uplands. The profile of the Hollis soils of this complex is similar to that described as representative for the series, but the mineral surface layer is generally thicker. The Charlton soils have a profile similar to that described as representative for the Charlton series. Fifty to 60 percent of this complex is made up of Hollis soils, 30 to 40 percent is Charlton soils, and the rest is included soils.

Included in mapping are areas of moderately deep soils, areas of soil that are yellowish red to strong brown throughout the profile, areas of wetter soils in depressions, and areas of soils that are more gently sloping. Areas of Buxton soils are common inclusions in the Durham, Dover, and Rollinsford areas. In some areas Hollis soils are underlain with rippable bedrock.

Because of the shallow depth over bedrock, the Hollis soils lack adequate moisture for plant growth. Conservation practices are generally needed to control erosion when these soils are cultivated or disturbed during construction work. Shallowness to bedrock is a limitation when these soils are used for residential and industrial development.

The soils in this complex are better suited to grasses and legumes than to corn and truck crops. Because of the variations in soil depth, an investigation is needed to determine if a specific area is suited to corn.

For optimum crop growth, truck crops require irrigation. Diversions, stripcropping, or contour farming are practices needed to control erosion when these soils are used extensively for row crops. These practices may also be needed in cropping systems that include cover crops and grasses and legumes in the rotation. In places the location and construction of diversions is limited by the variable depth to bedrock.

Most areas of soils are in hay or pasture. A few spots are wooded. Some areas near the seacoast are in the path of expanding community development. (Capability unit IIIe–56)

Hollis-Charlton fine sandy loams, 8 to 15 percent slopes (HcC).—This complex consists of shallow Hollis soils and deep Charlton soils. These rolling soils are mainly in cleared fields on uplands. The Hollis soils have a profile described as representative for the series. The Charlton soils have a thinner mineral surface layer than the soil described as representative for the Charlton series. Fifty to 60 percent of the complex is Hollis soils, 30 to 40 percent is Charlton soils, and the rest is included soils. Seep spots are common in some areas.

Included in mapping are areas of moderately deep soils and areas of soils that are yellowish red to strong brown throughout the profile. Areas of Buxton soils are common inclusions in the Durham, Dover, and Rollinsford areas. In some areas Hollis soils are underlain with rippable bedrock.

The Hollis soils are shallow to bedrock and lack adequate moisture for plant growth. If they are cultivated or are disturbed by construction work, erosion control measures are generally needed. Shallowness is the major limitation to most community development uses.

These soils are better suited to grasses and legumes than to corn and truck crops. Because of the variations in soil depth and the irregular slopes, an investigation is needed to determine the suitability of any specific area for corn or truck crops. Alfalfa is suited only to the deeper soils.

Diversion, stripcropping, or contour farming are necessary to control erosion if these soils are used for row crops. These practices are also needed in cropping systems that include cover crops and grasses and legumes in the rotation. The location and construction of diversions are limited by the variable depth of the soils and the irregular slopes.

Most areas of these soils are in hay and pasture. A few areas are forested. Some areas near the seacoast are in the path of expanding community development. (Capability unit IVe–56)

Hollis-Charlton fine sandy loams, 15 to 25 percent slopes (HcD).—This complex consists of soils that are mainly in long, narrow areas in small fields of the central uplands. They have a profile similar to that described as representative for their respective series, but the mineral surface layer is thinner. Fifty to 60 percent of this complex is shallow Hollis soils, 30 to 40 percent is deep Charlton soils, and the rest is included soils. There are very few rock outcrops.

Included in mapping are areas of moderately deep soils and areas of soils that are yellowish red to strong brown throughout the profile. In some areas the Hollis soils are underlain with rippable bedrock.

The Hollis soils lack adequate moisture for plant growth. Shallow depth to bedrock and moderately steep slopes present serious limitations to farm use and to most nonfarm uses. The soils of this complex have a high erosion hazard. They are not suited to cultivated crops. They are well suited to hay and pasture plants. When renovating hayfields, reseeding should be in strips across the slope to control erosion. Deep-rooted plants, such as alfalfa, do not do well in the shallow areas.

These soils are used mostly for forestry, hay, or pasture. They have some potential for the development of open-land and woodland wildlife habitat. (Capability unit VIe–56)

Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes (HdB).—This complex consists of shallow Hollis soils and deep Charlton soils. The profile of these soils is similar to that described as representative for their respective series, but they have a darker colored mineral surface layer. Hollis soils occupy 40 to 60 percent of this unit, Charlton soils 30 to 40 percent, and included soils the rest. These soils have outcrops of bedrock 30 to 100 feet apart and covering 10 to 25 percent of the surface. There are also some stones on the surface.

Included in mapping are areas of Sutton, Leicester, and Buxton soils, which are common in depressions in the southern part of the county. Also included are areas of nearly level, very rocky Hollis soils, areas of moderately deep soils, and areas of soils that are yellowish red to strong brown throughout the profile. Some areas of soils are underlain by rippable bedrock.

Shallow depth of soil, rockiness, and stoniness in some areas are severe limitations to row and hay crop production. Rock outcrops are so numerous that cultivation is not practical. These conditions are also severe limitations for most nonfarm uses.

Most areas of these soils are forested. A small acreage is in unimproved pasture (fig. 8). Some areas can be cleared for hay or improved pasture. Limitations to use of these soils in community development are severe. (Capability unit VIs–57)

Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes (HdC).—This complex consists of shallow Hollis soils and deep Charlton soils. The profile of these soils is similar to that described as representative for their respective series, but they have a darker colored mineral surface layer. The Hollis soils make up 40 to 60 percent of this unit, the Charlton soils 30 to 40 percent, and included soils the rest. These soils have outcrops of bedrock 30 to 100 feet apart and covering 10 to 25 percent of the surface. A few stones are on the surface.

Included in mapping are areas of Sutton and Woodbridge soils that occupy depressions. Also included are areas of moderately deep soils, areas of soils that are yellowish red to strong brown throughout the profile, and areas of soils that are underlain by rippable bedrock.

Shallowness, rockiness, and stones on the surface in places are major limitations of these soils for farm and nonfarm uses.

Most areas of these soils are in forest and unimproved pasture. They are suited to forestry, unimproved pasture, or woodland wildlife habitat. Limitations to use of these soils for community development are severe. (Capability unit VIs–57)

Hollis-Charlton very rocky fine sandy loams, 15 to 25 percent slopes (HdD).—This complex consists of shallow Hollis soils and deep Charlton soils that are typically in the central part of the county. The profile of these soils is similar to that described as representative for their respective series, but they have a thinner mineral surface layer because of erosion. The Hollis soils make up 40 to 60 percent of this unit, Charlton soils 30 to 40 percent, and included soils the rest. These soils have outcrops of bedrock 30 to 100 feet apart and covering 10 to 25 percent of the surface. A few stones are on the surface.

Included in mapping are areas of moderately deep soils and areas of soils that are yellowish red to strong brown throughout the profile. Some areas of soils in this complex are underlain by rippable bedrock.

Because of the rock outcrops, shallowness, and moderately steep slopes, use of these soils is limited to forestry, pasture, and woodland wildlife habitat. Most areas of these soils are forested. They are too steep, too rocky, and too stony for use in community development. (Capability unit VIs–57)

Figure 8.—**Unimproved pasture on Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes.**

Hollis-Charlton extremely rocky fine sandy loams, 8 to 25 percent slopes (HeD).—This complex consists of shallow Hollis soils and deep Charlton soils. The Charlton soils are in pockets among the Hollis soils. The profile of these soils is similar to that described as representative for their respective series, but they have a thinner and darker colored mineral surface layer. The Hollis soils make up 30 to 50 percent of this unit, Charlton soils 20 to 30 percent, and included soils the rest. Rock outcrops are typically less than 30 feet apart and cover about 25 to 50 percent of the surface. A few stones and boulders are on the surface.

Included in mapping are areas of less sloping, extremely rocky Hollis soils and areas of extremely rocky soils that are yellowish red to strong brown throughout the profile. Pockets are typically occupied by Sutton and Leicester soils.

The many rock outcrops on the soils of this complex are a severe limitation to both farm and nonfarm uses.

Most areas of these soils are forested, a use to which they are well suited. The forests yield timber, protect watersheds, and serve as wildlife habitat. Tree growth is somewhat limited by the shallow depth of the soils to bedrock. Woodland management is difficult because of the many rock outcrops and stones and boulders on the surface. (Capability unit VIIs–58)

Hollis-Charlton extremely rocky fine sandy loams, 25 to 60 percent slopes (HeE).—This complex consists of shallow Hollis soils and deep Charlton soils. The Charlton soils lie in pockets among the Hollis soils. The profile of these soils is similar to that described as representative for their respective series, but they have a thinner mineral surface layer. Hollis soils make up 30 to 50 percent of this complex, Charlton soils 20 to 30 percent, and included soils the rest. Rock outcrops are typically less than 30 feet apart and cover about 25 to 50 percent of the surface. Stones and boulders on the surface are common.

Included in mapping are areas of soils that are yellowish red to strong brown throughout the profile. Also included are areas of soils that have fewer rock outcrops, stones, and boulders on the surface.

The soils in this complex are too rocky and steep for most farm and nonfarm uses. They are largely in forest, a use to which they are well suited. The forests produce timber, protect watersheds, and serve as wildlife habitat. Woodland management, however, is difficult because of poor access and severe equipment limitations. Some areas of these soils have good potential for recreational development. (Capability unit VIIs–58)

Hollis-Gloucester fine sandy loams, 3 to 8 percent slopes (HfB).—This complex consists of shallow Hollis soils and deep Gloucester soils. These soils are generally on rolling uplands in the vicinity of Farmington, New Durham, Middleton, and Milton. The Hollis soils have a profile similar to that described as representative for the series, but the mineral surface layer is generally thicker. The Gloucester soils have a profile similar to that described as representative for the Gloucester series. About 60 percent of this complex is Hollis soils, about 30 percent is Gloucester soils, and the rest is included soils.

Included in mapping are areas of moderately deep soils, areas of soils that have a reddish-brown to yellowish-red layer in the upper part of the subsoil, and areas of Acton and Leicester soils in pockets.

The shallowness of these soils over bedrock and an erosion hazard are limitations to farm and nonfarm uses. Erosion control is generally needed if these soils are cultivated or are disturbed during construction work.

These soils are better suited to grasses and legumes than to corn and truck crops. Because of variations in soil depth, an investigation is needed to determine if a specific area is suited to corn.

For optimum growth, truck crops need irrigation. Diversions, stripcropping, or contour farming are needed to control erosion when these soils are used extensively for row crops. These practices may also be needed in cropping systems that include cover crops, grasses, and legumes in the rotation. The variable depth to bedrock restricts the location and construction of diversions.

Most areas of this complex are in hay and pasture. Some areas are wooded. Mortality of natural or planted trees in the Gloucester part of this complex is usually between 25 and 50 percent. Brush that invades open areas delays natural or artificial regeneration. (Capability unit IIIe-56)

Hollis-Gloucester fine sandy loams, 8 to 15 percent slopes (HfC).—This complex consists of shallow Hollis soils and deep Gloucester soils. These soils are generally on rolling uplands in the vicinity of Farmington, New Durham, Middleton, and Milton. The Hollis soils of this complex have a profile similar to that described as representative for the series. The Gloucester soils have a profile similar to that described as representative for the series, but they have a thinner surface layer. About 60 percent of this complex is Hollis soils, about 30 percent is Gloucester soils, and the rest is included soils.

Included in mapping are areas of moderately deep soils, areas of soils that have a reddish-brown to yellowish-red layer in the upper part of the subsoil, and areas of Acton soils in pockets.

The shallowness of the Hollis soils limits the moisture available to plants. Erosion control measures are needed when these soils are cultivated or disturbed during construction work. Shallowness is also an important limitation where these soils are used for community development.

The soils in this complex are better suited to grasses and legumes than to corn and truck crops. Because of the irregular slopes and the variations in soil depth, an investigation is needed to determine the suitability of any specific area for corn or truck crops. Alfalfa is suited mostly to the deeper soils.

Diversions, stripcropping, or contour farming is needed to control erosion if the soils are used for row crops. These practices are also needed in cropping systems that include cover crops, grasses, and legumes in the rotation. The location and construction of diversions are limited by the different depth of the soils and by the irregular slopes.

Most areas of this complex are in hay and pasture. A few areas are wooded. Mortality of natural or planted trees in the Gloucester part of this complex is between 25 and 50 percent. Brush invasion of open areas delays natural or artificial regeneration. (Capability unit IVe-56)

Hollis-Gloucester very rocky fine sandy loams, 3 to 8 percent slopes (HgB).—This complex consists of shallow Hollis soils and deep Gloucester soils. These soils are generally on rolling uplands in the Farmington, New Durham, Middleton, and Milton areas. They have a profile similar to the one described as representative for their respective series, but they have a darker colored mineral surface layer. About 50 percent of this complex is Hollis soils, about 30 percent is Gloucester soils, and about 20 percent is Rock outcrop and included soils. Outcrops of bedrock are 30 to 100 feet apart. Some stones and boulders are on the surface of these soils.

Included in mapping are areas of moderately deep soils, areas of soils that are reddish-brown to yellowish-red in the upper part of the subsoil, and areas of Acton and Leicester soils in pockets.

Because of rockiness and, in places, stoniness, the soils in this complex are not suitable for cultivation. Most areas of these soils are forested. A few small areas are in commercial blueberries. It generally is not feasible to clear these soils for residential or industrial uses.

A mortality rate of 25 to 50 percent can be expected for naturally occurring or planted trees in the Gloucester part of this complex. Brush invasion of open areas delays development of seedlings into good stands of trees. (Capability unit VIs-57)

Hollis-Gloucester very rocky fine sandy loams, 8 to 15 percent slopes (HgC).—This complex consists of soils that generally occupy uplands in the Farmington, New Durham, Middleton, and Milton areas. The profile of these soils is similar to that described as representative for their respective series, but their mineral surface layer is darker colored. This complex is made up of about 50 percent shallow Hollis soils, about 30 percent deep Gloucester soils, and about 20 percent Rock outcrop and included soils. Bedrock exposures are 30 to 100 feet apart, and stones and boulders are on the surface in some places.

Included in mapping are areas of moderately deep soils, areas of soils that are reddish brown to yellowish red in the upper part of the subsoil, areas of soils that have a loamy sand pan layer, and spots of Acton soils.

Because of rock outcrops, stones on the surface and, in places, boulders, these soils are not suited to cultivated crops. They are largely in forest, but a small acreage has been cleared and is used for commercial blueberries. Cleared areas are subject to erosion. Generally it is not feasible to clear these soils for residential or industrial uses.

A mortality rate of 25 to 50 percent for naturally occurring or planted trees can be expected in the Gloucester part of this complex. Brush invasion of open areas

delays the development of seedlings into good stands of trees. (Capability unit VIs–57)

Hollis-Gloucester very rocky fine sandy loams, 15 to 25 percent slopes (HgD).—The soils in this complex are mostly on uplands in the Farmington, New Durham, Middleton, and Milton areas. Hollis and Gloucester soils have a profile similar to the one described as representative for their respective series, but they have a thinner mineral surface layer. This complex is about 50 percent shallow Hollis soils, about 30 percent deep Gloucester soils, and about 20 percent Rock outcrop and included soils. A few stones and boulders are on the surface, and bedrock exposures are 30 to 100 feet apart.

Included in mapping are areas of moderately deep soils, areas of soils that are reddish brown to yellowish red in the upper part of the subsoil, seep spots, and areas of steeper very rocky Hollis and Gloucester soils.

The soils in this complex are too rocky and steep for farm use and for most nonfarm uses. A small acreage is in commercial blueberries. Cleared areas are subject to erosion. Most areas of these soils are forested. Although some areas are used for grazing, it generally is not feasible to clear these soils for uses other than forestry.

A mortality rate of 25 to 50 percent can be expected for naturally occurring or planted trees in the Gloucester part of this complex. Brush invasion of open areas delays satisfactory development of seedlings into good stands of trees. (Capability unit VIs–57)

Hollis-Gloucester extremely rocky fine sandy loams, 8 to 25 percent slopes (HID).—The soils in this complex are mostly on uplands of the northern and western parts of the county. The profile of these soils is similar to that described as representative for their respective series, but they have a thinner and darker colored mineral surface layer. About 30 to 50 percent of this complex is shallow Hollis soils, 20 to 30 percent is deep Gloucester soils, and 25 to 50 percent is Rock outcrop and included soils. Rock exposures are less than 30 feet apart, and stones and boulders are on the surface in places.

Included in mapping are areas of soils that are reddish brown to yellowish red in the upper part of the subsoil and some pockets of Acton and Leicester soils in less sloping areas.

Abundant rock outcrops and moderately steep slopes are major limitations to most uses of the soils in this complex. Although tree growth is retarded in the Hollis soils, these soils are generally suited to forestry or wildlife habitat; a small acreage is in commercial blueberries.

A mortality rate of 25 to 50 percent can be expected for naturally occurring or planted trees in the Gloucester part of this complex. Brush invasion of open areas in Gloucester soils delays development of seedlings into normal stands of trees. The forests yield timber, protect watersheds, and serve as wildlife habitats. (Capability unit VIIs–58)

Hollis-Gloucester extremely rocky fine sandy loams, 25 to 60 percent slopes (HIE).—These steep soils are mostly on uplands of the northern and western parts of the county. They have a profile similar to the one described as representative for their respective series, but they have a thinner mineral surface layer. About 30 to 50 percent of this complex is shallow Hollis soils, 20 to 30 percent is deep Gloucester soils, and 25 to 50 percent is Rock outcrop and included soils. Rock exposures are less than 30 feet apart, and stones and boulders are on the surface in some places.

Included in mapping are areas of soils that are reddish brown to yellowish red in the upper part of the subsoil. Also included are small areas of soils where less than 25 percent of the surface is covered by rock outcrops.

The soils in this complex are too rocky and too steep for most farm and nonfarm uses. Most areas of the soils are in forest, a use to which they are well suited. Woodland management is difficult, however, because access is poor and equipment limitations are severe.

A mortality rate of 25 to 50 percent can be expected for naturally occurring or planted trees in the Gloucester part of this complex. Brush invasion of open areas in Gloucester soils delays development of seedlings into normal stands of trees. The forests yield timber, protect watersheds, and serve as wildlife habitats. Some areas have good potential for hiking and for development of scenic vistas. (Capability unit VIIs–58)

Leicester Series

The Leicester series consists of deep, somewhat poorly drained and poorly drained soils that formed in loamy glacial till. The water table is at or near the surface during wet seasons. These soils occupy depressions and nearly level and gently sloping areas on uplands throughout the county. Most areas are wooded. White pine, hemlock, white ash, and red maple are the dominant species of trees.

A representative profile of a Leicester soil in a forested area has a layer of forest litter containing needles, leaves, and twigs about 1 inch thick overlying a very dark gray fine sandy loam mineral surface layer 5 inches thick. Below this is a subsurface layer of mottled, gray sandy loam about 7 inches thick. The subsoil is mottled, olive-gray sandy loam about 13 inches thick. The underlying material to a depth of about 44 inches is mottled grayish-brown and olive-gray sandy loam.

Leicester soils are saturated with water most of the year. After the water table drops, movement of water through the soil is moderately rapid. Wetness is a severe limitation for most uses.

Representative profile of a Leicester fine sandy loam (slope of 2 percent) in a forested area 150 feet south of Leighton Corners in the town of Strafford.

O1—1 inch to 0, forest litter of loose needles, leaves, and twigs.

A1—0 to 5 inches, very dark gray (10YR 3/1) fine sandy loam; weak, fine, granular structure; very friable; many roots; 5 percent cobblestones and gravel; very strongly acid; abrupt, smooth boundary.

A2g—5 to 12 inches, gray (N 6/0) sandy loam; common, medium, prominent, reddish-brown (5YR 4/4) mottles; moderate, medium, granular structure; friable; few roots; 15 percent cobblestones and gravel; strongly acid; abrupt, wavy boundary.

B2g—12 to 25 inches, olive-gray (5Y 5/2) sandy loam; common, medium, prominent, red (2.5YR 4/6) mottles; weak, medium, granular structure; friable; 5 percent cobblestones and gravel; strongly acid; clear, wavy boundary.

C—25 to 44 inches, 65 percent grayish-brown (2.5Y 5/2) and 35 percent olive-gray (5Y 5/2) sandy loam;

common, medium, prominent, red (2.5YR 4/6) mottles; massive; firm; 10 percent cobblestones and gravel; strongly acid.

Texture of the A and B horizons is fine sandy loam or sandy loam. The Ap or A1 horizon is 10YR in hue, 2 or 3 in value, and 1 or 2 in chroma. The matrix color of the A2g and B2g ranges from 10YR to 5Y in hue, 4 to 6 in value, and 0 to 2 in chroma. At a depth of more than 30 inches, the texture is fine sandy loam, sandy loam, or loamy sand. Consistence of the C horizon generally ranges from friable to firm. Cobblestones and gravel-size fragments make up 5 to 20 percent (by volume) of the B horizon and generally a greater percentage of the C horizon. Depth to distinct or prominent mottles ranges from 5 to 12 inches.

Leicester soils are near the Sutton and Whitman soils. They formed in similar materials as the Sutton soils but are more poorly drained. The Leicester soils are better drained than the Whitman soils and lack the very firm fragipan.

Leicester fine sandy loam, 0 to 8 percent slopes (LcB).—This soil occupies areas on upland hills. Areas are generally 3 to 10 acres in size. This soil has the profile described as representative for the series.

Included in mapping are small areas of Ridgebury and Whitman soils; long, narrow, wet areas of soils along streams; and scattered very stony patches of soils.

Unless these soils are drained, they are suited only to hay and pasture crops. They warm slowly in spring. If artificially drained, moisture-tolerant row crops, grasses, and legumes can be used. If the drainage system is adequate, a cropping system may include row crops, cover crops, and grasses and legumes. Tile and surface drainage and diversions, in gently sloping areas, are used to remove excess water. Most stones have been removed from the surface, but stones below the surface interfere with tillage in places. The effects of wetness must be considered when these soils are fertilized.

Wetness is a major concern of management for both farm and nonfarm uses. Undrained areas are used mostly for pasture or are idle. The nearly level areas of this soil have good potential for dugout ponds. (Capability unit IIIw–53)

Leicester very stony fine sandy loam, 0 to 3 percent slopes (LeA).—This soil occupies depressions and low-lying areas on uplands, and areas are 10 to 100 acres or more in size. Typically, this soil has a very stony fine sandy loam surface layer underlain by sandy loam and fine sandy loam to a depth of 40 inches or more. Stones and gravel are throughout the profile; stones on the surface are from 5 to 30 feet apart and cover as much as 3 percent of the surface. The seasonal high water table is near the surface for 7 to 9 months of the year.

Included in mapping are small areas of very poorly drained Whitman soils and areas of poorly drained Ridgebury soils. Also included are areas of extremely stony soils and long, narrow, wet areas of soils near streams.

Wetness and stoniness are major limitations for most farm and nonfarm uses. This soil is not suitable for row or hay crop production. Most areas are undrained and are used for forestry, unimproved pasture, or wildlife habitat. The high water table does not seriously restrict the growth of white pine and red spruce. If cleared of stones and artificially drained, these soils can be used for forage crops. The potential for dugout ponds and wetland wildlife habitat is good. (Capability unit VIIs–73)

Leicester very stony fine sandy loam, 3 to 8 percent slopes (LeB).—This soil occupies depressions and lower side slopes of upland hills. Individual areas are 10 to 100 acres or more in size. This soil has a very stony fine sandy loam surface layer underlain by sandy loam and fine sandy loam to a depth of 40 inches or more. Stones on the surface are from 5 to 30 feet apart in most areas, and they cover as much as 3 percent of the surface. The seasonal high water table is near the surface for 7 to 9 months of the year.

Included in mapping are areas of Ridgebury soils, spots of Whitman soils, and some areas of soils that are extremely stony.

Stoniness and wetness are major limitations of this soil for most uses. It is not suitable for row or hay crops. It is mostly in forest and unimproved pasture or is used for wildlife habitat. It is well suited to forestry. The high water table does not seriously restrict the growth of white pine and red spruce. If this soil is cleared of stones and artificially drained, it can be used for forage crops. (Capability unit VIIs–73)

Leicester-Ridgebury very stony fine sandy loams, 0 to 3 percent slopes (LrA).—This complex consists of areas of somewhat poorly drained and poorly drained Leicester soils and Ridgebury soils in depressions and in broad, level to nearly level areas on uplands. About 60 percent of this complex is Leicester soils, about 30 percent is Ridgebury soils, and about 10 percent is included soils. The profile of these soils is similar to that described as representative for their respective series, but the mineral surface layer is thinner and darker colored. Stones on the surface are typically 5 to 30 feet apart and cover about 3 percent of the surface.

Included in mapping are areas of very stony and extremely stony Whitman soils and small areas of organic soils that are more than 18 inches thick. Also included are areas of poorly drained and very poorly drained soils that formed mostly in sands.

Because of wetness and stoniness, these soils are not suitable for cultivation. They are used mostly for forestry, wildlife habitat, and unimproved pasture. The potential for wetland wildlife habitat is good. (Capability unit VIIs–73)

Leicester-Ridgebury very stony fine sandy loams, 3 to 8 percent slopes (LrB).—The soils in this complex are intermingled in depressions and in broad, gently sloping areas on uplands. They consist of somewhat poorly drained and poorly drained Leicester and Ridgebury soils. These soils have a profile similar to the one described as representative for their respective series, but the mineral surface layer is generally thinner. About 60 percent of this complex is Leicester soils, about 30 percent is Ridgebury soils, and about 10 percent is included soils. Stones on the surface typically are from 5 to 30 feet apart and cover about 3 percent of the surface.

Included in mapping are areas of poorly drained soils that formed in sand and areas of extremely stony soils. Also included are small, scattered areas of Whitman soils in depressions and small spots of Leicester and Ridgebury soils that have slopes greater than 8 percent.

These soils are not suitable for cultivation, because of wetness and stoniness. They are largely used for forest, wildlife habitat, and unimproved pasture. They are well suited to forestry and woodland wildlife habitat. (Capability unit VIIs–73)

Made Land

Made land (Ma) consists of areas that have been filled with various kinds of soil material or trash and then leveled. It commonly occurs in and around urban areas. The soils can no longer be identified because the natural soil profile has been covered or destroyed by earthmoving operations.

Conditions for plant growth are extremely variable; consequently, management needs vary. (Not assigned to a capability unit)

Mixed Alluvial Land, Wet

Mixed alluvial land, wet (Ml) consists of various kinds of soil materials on the bottom lands of streams and rivers. The soil material ranges in texture from silt loam to sand and gravel. This land type is moderately well drained to very poorly drained and it is frequently flooded. Alders, sedges, rushes, and red maple are common types of vegetation.

Much of this land type is waterlogged most of the time, and drainage generally is not feasible. Areas of Mixed alluvial land, wet, are commonly important as wetland wildlife habitat. (Capability unit VIIw–14)

Muck and Peat

Muck and peat (Mp) consists of organic matter in deposits that are 18 inches to more than 10 feet deep. In most places deposits are at least 3 feet deep. The native vegetation in areas not forested is mainly mosses, sedges, reeds, highbush blueberries, and cranberries (fig. 9). Forested areas produce red maple, alder, willow, hemlock, spruce, tamarack, and swamp white-cedar.

Muck and peat is in formerly ponded depressions on uplands, on sand plains, and on flood plains where plant remains have accumulated for a long time. The ground water is near enough to the surface to keep the plant remains saturated most of the year. This helps to preserve the remains. The depressions are frost pockets in which frost is likely to occur very late in spring and very early in fall. Some of the depressions are flooded by runoff from higher areas.

In some places the surface layer formed from the residue of trees and other woody plants. In other places it formed from mosses, reeds, and sedges. Where the plant material is sufficiently fresh and intact to permit identification of plant forms, the material is peat. Where the plant material is so decomposed that recognition of plant parts is impossible, the material is muck. Most areas of this land type are extremely acid. Attempts have been made to use the peat in several bogs for commercial purposes but with little success. (Not assigned to a capability unit.)

Figure 9.—**Typical area of Muck and peat covered with reeds and sedges.**

Ondawa Series

The Ondawa series consists of well-drained soils that formed in thick alluvial deposits. These are nearly level soils on the flood plains of major streams in the county, and they are subject to flooding. Most areas are along the Cocheco River.

A representative profile of an Ondawa soil in a cultivated area has a dark-brown fine sandy loam surface layer about 10 inches thick. The next layer is yellowish-brown fine sandy loam about 20 inches thick. Below this layer to a depth of about 42 inches is yellowish-brown loamy fine sand that contains thin bands of sand.

The Ondawa soils have moderately rapid permeability and moderate available water capacity. Occasional flooding is a limitation to their use for community development.

Representative profile of an Ondawa fine sandy loam (slope of 2 percent) in a cultivated area 400 yards west of County Farm Cross Road, one-half mile northwest of junction of County Farm Road and County Farm Cross Road in Dover:

Ap—0 to 10 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; many roots; strongly acid; clear, wavy boundary.

B21—10 to 25 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, fine, granular structure; very friable; common roots; medium acid; clear, wavy boundary.

B22—25 to 30 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; friable; few roots; medium acid; clear, wavy boundary.

C—30 to 42 inches, yellowish-brown (10YR 5/4) loamy fine sand containing sand bands ¼ to ½ inch thick; weak, medium, granular structure; friable; medium acid.

The A and B horizons are fine sandy loam or sandy loam. Hue in the A horizon is 10YR or 2.5Y, value is 3 to 6, and chroma is 2 to 4. Texture to a depth of more than 30 inches is loamy sand, loamy fine sand, or sand. Hue in the B and C horizons is 10YR and 2.5Y, value is 3 to 6, and chroma is 2 to 6. Reaction is medium acid or slightly acid in the C horizon.

Ondawa soils formed in similar alluvial material as Rumney and Suncook soils. They are better drained than Rumney soils and have finer textures in the upper part of the profile than Suncook soils. Ondawa soils are finer textured throughout the profile than nearby Windsor soils and are more susceptible to flooding from nearby streams.

Ondawa fine sandy loam (On).—This nearly level, well-drained soil commonly occupies small flood plains. It

lies in areas between rivers and poorly drained soils at the foot of terraces. Individual areas of this soil are long and narrow and are 5 to 10 acres in size. Some areas are subject to frequent flooding.

Included in mapping are small areas of Podunk soils, spots of silty soils, and narrow strips of Suncook soils.

This soil is suited to truck crops, field crops, hay, and pasture. The hazard of erosion is slight, and flooding is seldom a limitation for crop production. Special management, however, is needed to maintain the organic-matter content. Ponding, which occurs when the soil is frozen, can be eliminated by land smoothing. A strip of sod along a streambank can be effective in controlling streambank erosion.

Most of this soil is in hay, pasture, or silage corn. Flooding is a limitation for residential and industrial development. (Capability unit I–1)

Paxton Series

The Paxton series consists of deep, well-drained loamy soils that formed in stony glacial till. They have a pan layer at a depth of 16 to 36 inches. Paxton soils are generally on the upper parts of rolling foothills in the western and central parts of the county. Common trees on these soils are white pine, sugar maple, red oak, and northern hardwoods.

A representative profile of a Paxton soil in a plowed area has a surface layer that is very drak grayish-brown fine sandy loam about 8 inches thick. The subsoil is fine sandy loam to a depth of about 22 inches. The upper 3 inches of the subsoil is yellowish brown, and the lower 11 inches is light olive brown. Below this, to a depth of about 41 inches, is a grayish-brown sandy loam pan layer that is difficult to dig with a spade.

Permeability is moderate above the pan layer but is moderately slow through the pan. Water moves over the pan and comes to the surface downslope as seep spots. Paxton soils retain a good supply of water available to plants.

These are among the better soils on the uplands for farming and timber production but have limitations for community development. Septic tank filter fields do not function well, and seepage of water into cellars can be expected because of the moderately slowly permeable pan layer.

Representative profile of a Paxton fine sandy loam (slope of 5 percent) in a hayfield on Caverly Hill about 1¾ miles east of Bow Lake Village and 400 feet south of Province Road in the town of Strafford:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; 5 percent subangular coarse fragments, mostly ¼ to ½ inch in size; medium acid; abrupt, smooth boundary.

B21—8 to 11 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, medium, granular structure; friable; many roots; 5 percent subangular coarse fragments, mostly ½ to ¾ inch in size; slightly acid; abrupt, wavy boundary.

B22—11 to 22 inches, light olive-brown (2.5Y 5/4) fine sandy loam; weak, thick, platy structure; firm; common roots; 15 percent coarse fragments, mostly 1 to 2 inches in size; medium acid; clear, wavy boundary.

Cx—22 to 41 inches, grayish-brown (2.5Y 5/2) sandy loam; moderate, thick, platy structure; very firm; 15 percent coarse fragments, mostly 1 to 2 inches in size; medium acid.

The texture of the A and B horizons is fine sandy loam or loam. Coarse fragments of all sizes make up 2 to 25 percent, by volume, of these horizons. The upper part of the B horizon is 7.5YR or 10YR in hue, 3 to 5 in value, and 4 to 8 in chroma. The lower part of the B horizon ranges from 10YR to 2.5Y in hue, 3 to 5 in value, and 4 to 6 in chroma. The Cx horizon ranges from fine sandy loam to sandy loam and contains 10 to 30 percent coarse fragments of all sizes. The depth to the fragipan ranges from 16 to 36 inches. A few faint mottles are in the fragipan or just above it.

Paxton soils formed in similar material and are near the Hollis, Charlton, and Woodbridge soils. They are deeper to bedrock than the Hollis soils and, unlike Charlton soils, have a strongly developed fragipan. The Paxton soils are better drained than the Woodbridge soils.

Paxton fine sandy loam, 0 to 8 percent slopes (PbB).—This soil lies in strips on the crests of drumlins. It has the profile described as representative for the series. Stones and gravel-size fragments are scattered throughout the profile.

Included in mapping are pockets of Woodbridge and Ridgebury soils and spots of Hollis soils. Small areas of a soil that contains a loamy sand pan layer are also included.

This soil is well suited to apple orchards, corn, small grains, grasses, and legumes. The pan layer restricts internal drainage and causes wetness in spring. This delays tillage operations and somewhat limits the suitability of this soil for truck crops.

Diversions, contour farming, or stripcropping are needed to control erosion when the steeper slopes are used extensively for cultivated crops. These practices are often used in cropping systems that include cover crops and grasses and legumes in the rotation. Orchards need cover crops and require spot drainage.

This soil is used mostly for hay, pasture, and corn for silage. Some areas are in apple orchards. The potential for development of open-land and woodland wildlife habitat is good. (Capability unit IIe–6)

Paxton fine sandy loam, 8 to 15 percent slopes (PbC).—This soil occupies the side slopes of drumlins in individual areas that are 5 acres to more than 50 acres in size (fig. 10). It has a profile similar to that described as representative for the series, but the surface layer is generally thinner. Stones and gravel-size fragments are scattered throughout the profile.

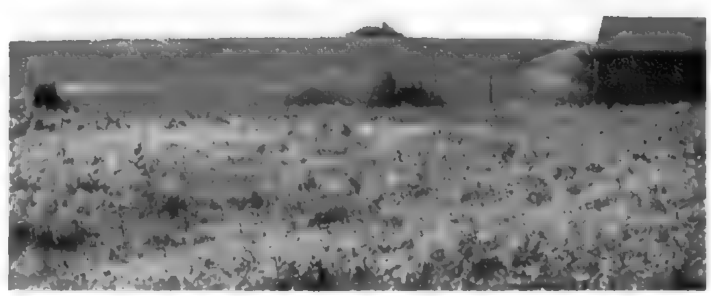

Figure 10.—**Paxton fine sandy loam, 8 to 15 percent slopes, on the side of a drumlin in the uplands.**

Included in mapping are pockets of Woodbridge soils and spots of Hollis soils. Small areas of a soil that contains a loamy sand pan layer are also included.

A pan layer restricts internal drainage and causes some crops to be late on this soil. Erosion control practices are needed if the surface layer is disturbed by cultivation or during construction work.

This soil is well suited to apple orchards, silage corn, grasses, and legumes. Row crops can be grown if erosion is controlled. Cropping systems that contain grasses or legumes in the rotation help to reduce soil losses. Among the beneficial erosion control practices are contour farming, stripcropping, and diversions. Drainage of seep spots is needed.

This soil is used mostly for hay, pasture, and silage corn. A few areas are in apple orchards. The potential for development of open-land and woodland wildlife habitat is good. (Capability unit IIIe-6)

Paxton fine sandy loam, 15 to 25 percent slopes (PbD).—This soil lies in long, narrow strips on the sides of drumlins and upland hills. Individual areas are 5 to 25 acres in size. This soil has a profile that is similar to that described as representative for the series, but generally the surface layer is thinner. The pan layer is at a depth of 16 to 20 inches.

Included in mapping are small areas of a soil that contains a loamy sand pan layer, spots of Hollis soils, and areas of more steeply sloping soils.

This soil is highly erodible when disturbed by cultivation or by construction work. If this soil is kept in sod or is forested, runoff and erosion are reduced.

The soil in this unit is suited to hay and pasture, but because of the erosion hazard and steep slopes, it is generally suited to row crops only if erosion is controlled and a long rotation that includes grasses and legumes is used. Reseeding of hay crops should be in strips to control erosion. If kept in sod, this soil is suited to apple orchards, but spot drainage is necessary. The steeper slopes are difficult to work safely using farm equipment. Most stones have been removed from the surface, but subsurface stones interfere with tillage.

Most of this soil is forested, and some of it is used for hay pasture. Steep slopes and the hazard of erosion are major management concerns for most uses. (Capability unit IVe-6)

Paxton very stony fine sandy loam, 3 to 8 percent slopes (PdB).—This soil typically occupies wooded upper slopes of drumlins. Individual areas are about 5 acres to more than 30 acres in size. This soil has a profile similar to that described as representative for the series, but the mineral surface layer is darker colored. Stones that average 1 to 1½ feet in diameter are 5 to 30 feet apart and cover as much as 3 percent of the surface.

Included are pockets of Woodbridge and Ridgebury soils, spots of Hollis soils, areas of extremely stony soils, small areas of soils that contain a loamy sand pan layer, and areas of soils that have a reddish-brown to yellowish-red layer in the upper part of the subsoil.

Stones on the surface restrict the use of tractor-drawn equipment, and cultivation is impractical; some areas, however, can be used for improved pasture. If stones are removed from the surface, this soil is suited to field and truck crops.

Most areas of this soil are forested, a use to which it is well suited. There is some potential for development of woodland wildlife habitat. (Capability unit VIs-7)

Paxton very stony fine sandy loam, 8 to 15 percent slopes (PdC).—This soil occupies wooded side slopes of drumlins, where it commonly joins the Woodbridge soils and the more sloping Paxton soils. Individual areas range from 5 acres to more than 60 acres in size. This soil has a profile similar to that described as representative for the series, but the mineral surface layer is thinner and darker colored. Stones that average 1 to 1½ feet in diameter are about 5 to 30 feet apart and cover as much as 3 percent of the surface.

Included in mapping are pockets of Woodbridge soils, spots of Hollis soils, and scattered areas of extremely stony soils. Also included are small areas of a soil that contains a loamy sand pan layer, and areas of soils that have a reddish-brown to yellowish-red layer in the upper part of the subsoil.

Stones on the surface are a limitation to crop production. Unprotected slopes are subject to erosion.

This soil is largely in forest, a use to which it is well suited. Some areas can be managed for improved pasture. (Capability unit VIs-7)

Paxton very stony fine sandy loam, 15 to 25 percent slopes (PdD).—This soil occupies side slopes of drumlins and rounded hills of the uplands. Individual areas are 10 to 80 acres in size. This soil has a profile similar to that described as representative for the series, but the mineral surface layer is thinner and darker colored. Stones that average 1 to 1½ feet in diameter are about 5 to 30 feet apart and cover up to 3 percent of the surface.

Included in mapping are spots of Hollis soils, areas of extremely stony soils, and small areas of a soil that contains a loamy sand pan layer. Also included are areas of soils that have a reddish-brown to yellowish-red layer in the upper part of the subsoil.

Major limitations of this soil are surface stoniness and moderately steep slopes. Unprotected slopes are subject to erosion.

This soil is not suitable for hay or row crops. It is largely forested, a use to which it is well suited. (Capability unit VIs-7)

Paxton very stony fine sandy loam, 25 to 60 percent slopes (PdE).—This soil occupies sides of drumlins and upland hills and is in long, narrow areas that are commonly 15 to 30 acres in size. It has a profile similar to that described as representative for the series, but the surface layer is thinner and darker colored. Stones that average 1 to 1½ feet in diameter are 5 to 30 feet apart and cover up to 3 percent of the surface.

Included in mapping are spots of Hollis soils, areas of extremely stony soils, and small areas of a soil that contains a loamy sand pan layer. Also included are areas of soils that have a reddish-brown to yellowish-red layer in the upper part of the subsoil.

This soil is too stony and too steep for hay or row crops. Most of it is forested, a use to which it is well suited. Other uses are not generally feasible. Timber harvesting operations are difficult on the steeper slopes. (Capability unit VIIs-7)

Podunk Series

The Podunk series consists of deep, moderately well drained, nearly level soils on flood plains. These soils formed in recent alluvial deposits. They are mostly near the Cocheco and Lamprey Rivers and are generally flooded annually. The woody vegetation is mainly alder, willow, and red maple.

A representative profile of a Podunk soil in a plowed area has a surface layer of dark yellowish-brown fine sandy loam 9 inches thick. The next layer, about 21 inches thick, is yellowish-brown fine sandy loam that contains light brownish-gray and red mottles in the lower part. Below this, to a depth of about 42 inches, is mottled, light olive-brown loamy fine sand.

Permeability is moderately rapid, and the available water capacity is moderate.

Representative profile of a Podunk fine sandy loam (slope of 2 percent) in a nearly level hayfield 200 feet west of State Route 108 and 1 mile north of the Rockingham County line in the town of Durham:

Ap—0 to 9 inches, dark yellowish-brown (10YR 3/4) fine sandy loam; weak, fine, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

B21—9 to 16 inches, yellowish-brown (10YR 5/6) fine sandy loam; moderate, medium, granular structure; friable; common roots; medium acid; clear, wavy boudary.

B22—16 to 30 inches, yellowish-brown (10YR 5/4) fine sandy loam; common, medium, distinct, light brownish-gray (2.5Y 6/2) mottles and common, medium, prominent, red (2.5YR 4/8) mottles; moderate, medium, granular structure; friable; few roots; strongly acid; abrupt, wavy boundary.

C—30 to 42 inches, light olive-brown (2.5Y 5/4) loamy fine sand; common, medium, prominent, yellowish-red (5YR 4/8) mottles; weak, medium, granular structure; nonsticky; medium acid.

Texture of the A and B horizons ranges from fine sandy loam to sandy loam. Hue of the B horizon ranges from 10YR to 2.5Y, and hue of the C horizon is 2.5Y or 5Y. Value of the B and C horizons ranges from 4 to 6, and chroma from 2 to 6. The C horizon below a depth of 30 inches is dominantly loamy fine sand but in some places contains thin strata of sand or gravel. Mottling occurs at a depth between 12 and 24 inches.

Podunk soils are near Ondawa and Rumney soils. In many places they are next to gravelly Hinckley soils. Podunk soils formed in material similar to that in which Ondawa and Rumney soils formed, but they are not so well drained as the Ondawa soils and are better drained than the Rumney soils. Unlike Hinckley soils, Podunk soils are subject to flooding and are finer textured throughout the profile.

Podunk fine sandy loam (Po).—This nearly level, moderately well drained soil commonly occupies small flood plains throughout the county. It generally occurs in narrow bands adjacent to streams and rivers.

Included in mapping are spots of Rumney and Suncook soils and small areas of a finer textured soil. Some areas of this soil in the town of Farmington are protected from flooding.

Seasonal wetness and periodic flooding are major concerns of management for most uses. Drainage is needed to lower the water table, particularly in areas that are to be used for truck crops. This soil can be cropped continuously if it is artificially drained and protected from flooding. If it is not drained, it is better suited to hay and pasture crops than to row crops. Cropping systems generally include row crops, cover crops, and grasses and legumes in a rotation.

Wetness and winterkill are limitations to the growing of some legumes. Depressions in this soil can be eliminated by land smoothing in some places. A permanent strip of sod along streams reduces the hazard of streambank erosion. Protection from grazing is advisable early in spring and during periods of prolonged wetness.

This soil is used mostly for hay and pasture. A few areas are forested. (Capability unit IIw–12)

Ridgebury Series

The Ridgebury series consists of deep, somewhat poorly drained and poorly drained loamy soils that formed in compact, stony glacial till. Typically, these soils occupy nearly level to gently sloping areas on drumlins, mainly in the central and northern parts of the county. Stones on the surface are common. A fragipan at a depth of 16 to 24 inches restricts the downward movement of water.

A representative profile of a Ridgebury soil in a plowed area has a surface layer of very dark brown fine sandy loam about 7 inches thick. The next layer, about 15 inches thick, is grayish-brown sandy loam that contains red mottles in the upper part and grayish-brown fine sandy loam that contains many reddish-yellow mottles in the lower part. Below this, to a depth of about 41 inches, is a mottled, olive gravelly sand loam pan layer that is hard to dig with a spade.

Permeability of these soils is moderately slow. Available water capacity is moderate. The pan layer and a high water table restrict root growth. These soils are slow to warm in spring. These limitations severely limit the use of these soils for community development and most other nonfarm uses.

Representative profile of Ridgebury fine sandy loam (slope of 2 percent) in a pasture 100 feet north of Province Road, about 2 miles east of Bow Lake Village in the town of Stafford:

Ap—0 to 7 inches, very dark brown (10YR 2/2) fine sandy loam; weak, fine, granular structure; friable; many roots; 10 percent subangular coarse fragments; medium acid; abrupt, smooth boundary.

B21g—7 to 13 inches, grayish-brown (2.5Y 5/2) sandy loam; common, medium, prominent, red (2.5YR 4/8) mottles; weak, fine, granular structure; friable; common roots; 5 percent subangular coarse fragments; medium acid; clear, smooth boundary.

B22g—13 to 22 inches, grayish-brown (2.5Y 5/2) fine sandy loam; many, medium, prominent, reddish-yellow (5YR 6/8) mottles; weak, medium, platy structure; firm; few roots; 15 percent subangular coarse fragments including cobblestones and stones; medium acid; clear, wavy boundary.

Cx—22 to 41 inches, olive (5Y 5/3) gravelly sandy loam; many, coarse, prominent, light-gray (5Y 6/1) and strong-brown (7.5YR 5/6) mottles; moderate, medium, platy structure; firm; 25 percent subangular coarse fragments that include cobblestones and stones; medium acid.

Texture of the A horizon is fine sandy loam or loam. The B horizon ranges from fine sandy loam to sandy loam. Hue of the B horizon is 10YR to 2.5Y in the upper part and 2.5Y or 5Y in the lower part. Value is 4 to 6 and chroma is 2 to 4. The Cx horizon ranges from fine sandy loam to coarse sandy loam that contains gravel in places. Thin layers of loamy sand are present in some places. Chroma of the Cx horizon

is generally 2 or 3. Depth to the firm or very firm fragipan layer ranges from 16 to 24 inches. Depth to distinct or prominent mottles ranges from 5 to 12 inches.

Ridgebury soils are near Paxton, Woodbridge, and Charlton soils. They formed in material similar to that in which those soils formed, but they are more poorly drained and have a darker colored A horizon. The Ridgebury soils have a strongly developed fragipan that is lacking in the Charlton soils.

Ridgebury fine sandy loam, 0 to 3 percent slopes (RgA).—This soil typically occupies long, narrow depressions on the crests of drumlins. Individual areas are 3 to 10 acres in size. This soil has the profile described as representative for the series. A water table is at or near the surface for 7 to 9 months of the year.

Included in mapping are areas of Whitman and Leicester soils and areas of soils that contain sand lenses in the subsoil. Saugatuck soils are also included in some areas.

Wetness is the major concern of management for most uses. Unless drained, this soil is suitable only for hay and pasture. It warms slowly in spring. Drained areas can be used for moisture-tolerant row crops, and cropping systems generally include adapted varieties of grasses and legumes in the rotation. Drainage can be improved by ditches, tile drains, or diversions. Most stones on the surface have been removed, but stones below the surface interfere with tillage in places. The effects of wetness must be considered in fertilizing this soil.

Most of this soil is forested or idle. It has a good potential for dugout ponds and wetland wildlife habitat. (Capability unit IIIw–63)

Ridgebury fine sandy loam, 3 to 8 percent slopes (RgB).—This soil typically occupies lower side slopes of drumlins. Individual areas are 5 to 10 acres in size. This soil has the profile described as representative for the series, but the pan layer is at a slightly greater depth. A water table is at or near the surface 7 to 9 months of the year.

Included in mapping are areas of Leicester and Woodbridge soils and areas of soils that contain sand lenses in the subsoil.

Inadequate drainage is a major limitation to use of this soil. Erosion also is a concern in the more sloping areas if this soil is disturbed by cultivation or construction work. Undrained areas are used mostly for hay and pasture. If adequately drained, this soil is suited to adapted hay and pasture plants and is fairly well suited to silage corn. Most stones on the surface have been removed, but stones below the surface interfere with tillage in places. Drainage outlets are easier to obtain in this soil than in less sloping Ridgebury soils.

On the steeper slopes, this soil requires diversions, contour farming, or stripcropping if it is used extensively for cultivated crops. The effects of wetness must be considered in fertilizing this soil.

Most of the soil is idle and is fairly well suited to development of woodland wildlife habitat. (Capability unit IIIw–63)

Ridgebury very stony fine sandy loam, 0 to 3 percent slopes (RlA).—This soil is on crests of broad drumlins and on valley floors on uplands. It has a profile similar to that described as representative for the series, but the depth to the pan layer ranges from 18 to 22 inches. Stones on the surface average 1 to 1½ feet in diameter and are 5 to 30 feet apart. They cover as much as 3 percent of the surface. A water table is at or near the surface 7 to 9 months of the year.

Included in mapping are areas of Whitman and Leicester soils, areas of sandier poorly drained soils, and some areas of extremely stony soils that are similar to those of the Ridgebury series.

Wetness and stoniness are major concerns of management for most uses of this soil. It is not suitable for cultivation. Removing stones and draining this soil are generally not economically feasible for the production of grasses and legumes.

Most areas of this soil are forested, a use to which it is well suited. This soil has a good potential for the development of wetland wildlife habitat. (Capability unit VIIs–73)

Ridgebury very stony fine sandy loam, 3 to 8 percent slopes (RlB).—This soil lies on the lower slopes of drumlins and upland hills in areas that are 5 acres to more than 200 acres in size. It has a profile similar to that described as representative for the series, but the depth to the pan layer ranges from 22 to 24 inches. Stones on the surface are generally 1 to 1½ feet in diameter, 5 to 30 feet apart, and cover as much as 3 percent of the surface. A water table is near the surface for 7 to 9 months of the year.

Included in mapping are areas of Whitman and Leicester soils, areas of sandier, poorly drained soils, and some areas of extremely stony soils that are similar to those of the Ridgebury series.

Wetness and stones are limitations to use of this soil. This soil is best suited to forestry. Removal of stones and use of drainage to make this soil suitable for the production of grasses and legumes are generally not economically feasible. The development of woodland wildlife habitat is a suitable use for this soil. (Capability unit VIIs–73)

Rock Outcrop

Rock outcrop (Ro) consists of areas that have more than 90 percent of the surface covered with exposures of bare bedrock. It occurs on mountains, hilltops, and steep cliffs, mostly in the western part of the county. Vegetation is sparse; it consists mainly of mosses, lichens, and small, scrubby trees. Rock outcrop has no value for farming, but it is suitable for scenic and recreational areas. (Capability unit VIIIs–90)

Rumney Series

The Rumney series consists of somewhat poorly drained and poorly drained loamy soils that formed in thick alluvial deposits along streams. Typically, these soils lie in nearly level, long, narrow areas near large and small streams throughout the county. They are subject to seasonal flooding.

A representative profile of a Rumney soil in a cultivated area has a very dark grayish-brown fine sandy loam surface layer 9 inches thick. The subsoil is mottled light brownish-gray fine sandy loam to a depth of about 34 inches. Below this, to a depth of about 41 inches, are layers of fine and medium gray sand.

Rumney soils have moderately rapid permeability and moderate available water capacity. A high water table and seasonal flooding limit these soils for many uses.

Representative profile of Rumney fine sandy loam (slope of 2 percent) in an idle hayfield 500 yards south of the junction of Chestnut Hill Road and Little Falls Bridge Road in the city of Rochester:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; medium acid; abrupt, smooth boundary.

B21g—9 to 23 inches, light brownish-gray (10YR 6/2) fine sandy loam; common, medium, distinct, strong-brown (7.5YR 5/8) mottles; weak, fine, granular structure; friable; few roots; strongly acid; clear, smooth boundary.

B22g—23 to 34 inches, light brownish-gray (10YR 6/2) light fine sandy loam; common, medium, prominent, dark-red (2.5YR 3/6) mottles; weak, fine, granular structure; friable; strongly acid; abrupt, smooth boundary.

IICg—34 to 41 inches, gray (5Y 5/1), intermingled layers of fine and medium sand; massive; nonsticky; strongly acid.

Texture of the A horizon is fine sandy loam or very fine sandy loam. The B horizon is fine sandy loam or sandy loam. The B horizon has a hue of 10YR and 2.5Y, a value of 3 to 6, and a chroma of 1 or 2. The C horizon ranges from loamy sand to gravelly sand. This horizon is 2.5Y or 5Y in hue, 3 to 6 in value, and 1 or 2 in chroma. Depth to distinct or prominent mottles ranges from 6 to 12 inches.

Rumney soils formed in alluvial material similar to that in which Ondawa and Podunk soils formed. They typically have a lower chroma in the A horizon and are more poorly drained than the well drained Ondawa soils and the moderately well drained Podunk soils.

Rumney fine sandy loam (Ru).—This nearly level, somewhat poorly drained and poorly drained soil typically occupies narrow strips along rivers at the edge or foot of adjoining terrace slopes. A high water table keeps this soil wet for 7 to 9 months a year, and it is subject to annual flooding from adjacent streams.

Included in mapping are areas of Podunk soils, small areas of very poorly drained soils, and spots that have gravel on the surface.

In its natural condition, this soil is better suited to hay and pasture than to cultivated crops. This soil can be drained, but outlets are difficult to obtain because at times the adjacent streams are nearly at the same level as the soil. If it is adequately drained, it is suited to corn and late vegetables. In applying fertilizer, the effects of excess moisture should be considered. Grazing should be restricted to periods when this soil is not wet.

Drainage can be improved by using tile drains, surface field ditches, or land smoothing.

This soil is largely in forest or is idle, but some areas are in pasture or hay. Natural areas are suitable for woodland wildlife habitat. (Capability unit IIIw-13)

Saugatuck Series

The Saugatuck series consists of somewhat poorly drained and poorly drained soils in depressions on outwash plains. These soils formed in thick deposits of medium and coarse sand. Common vegetation is red maple, white pine, highbush blueberry, and some red oak.

A representative profile of a Saugatuck soil in a forested area has a layer of loose leaves ½ inch thick that is underlain by 2½ inches of muck. The subsurface layer is 7 inches thick. The upper part is mottled, dark-gray loamy sand 4 inches thick. The lower part is gray medium sand 3 inches thick. The next layer is about 19 inches thick. In sequence from the top, the upper 6 inches is firm, very dusky red loamy sand; the next 4 inches is strongly cemented yellowish-red coarse and medium sand; and the lower 9 inches is strong-brown medium sand in the upper part and strong-brown and yellowish-red coarse sand in the lower part. Below this, to a depth of about 42 inches, is loose yellowish-brown fine sand in the upper 2 inches, loose light brownish-gray coarse sand in the next 8 inches, and loose yellowish-brown medium sand in the lower 6 inches.

Saugatuck soils are generally too wet for cultivation because they have a high water table above a moderately slowly permeable cemented pan. Wetness is a major limitation for most uses.

Representative profile of Saugatuck loamy sand (slopes of 2 percent) in a wooded area one-third mile north of Wadley Falls on Tuttle Road in the town of Lee:

O1 3 to 2½ inches, loose leaf litter.

O2—2½ inches to 0, black (10YR 2/1) muck.

A21g—0 to 4 inches, dark-gray (10YR 4/1) loamy sand; common, medium, faint, gray (10YR 6/1) mottles; weak, fine, granular structure; very friable; many roots; very strongly acid; abrupt, smooth boundary.

A22g—4 to 7 inches, gray (10YR 6/1) medium sand; single grain; loose; many roots; 2 percent fine gravel; strongly acid; abrupt, irregular boundary.

B21h—7 to 13 inches, very dusky red (2.5YR 2/2) loamy sand; massive; firm; common roots; 4 percent fine gravel; strongly acid; clear, wavy boundary.

B22ir—13 to 17 inches, yellowish-red (5YR 5/8) medium and coarse sand; massive; strongly cemented; 7 percent fine gravel; strongly acid; clear, wavy boundary.

B23ir—17 to 20 inches, strong-brown (7.5YR 5/8) medium sand; massive; weakly cemented; medium acid; clear, wavy boundary.

B24ir—20 to 26 inches, strong-brown (7.5YR 5/6) and yellowish-red (5YR 5/8) coarse sand; massive; weakly cemented; 7 percent fine gravel; medium acid; clear, wavy boundary.

C1—26 to 28 inches, yellowish-brown (10YR 5/6) fine sand; single grain; loose; medium acid; abrupt, wavy boundary.

C2—28 to 36 inches, light brownish-gray (10YR 6/2) coarse sand; single grain; loose; 10 percent fine gravel; medium acid; abrupt, wavy boundary.

C3—36 to 42 inches, yellowish-brown (10YR 5/6) medium sand; single grain; loose; medium acid.

Texture of the A horizon is loamy fine sand, loamy sand, or medium sand. The A2 horizon is 5YR to 10YR in hue, 4 to 7 in value, and 1 or 2 in chroma. The B21h horizon ranges from loamy sand to sand; it is 2.5YR or 5YR in hue, 2 or 3 in value, and 1 or 2 in chroma. The B22ir horizon ranges from 2.5YR to 7.5YR in hue, 3 to 5 in value, and 4 to 8 in chroma. The C horizon is 7.5YR or 10YR in hue and 4 to 6 in value. In some areas the lower boundary of the B22ir horizon is irregular and extends into the lower horizons. Mottling is not evident, but reddish-brown and strong-brown streaks are common throughout the profile in many places. The cemented pan is continuous in 50 to 100 percent of the areas of these soils.

Saugatuck soils formed in sandy material similar to that in which the nearby Windsor and Deerfield soils formed. Saugatuck soils are more poorly drained and have a strongly cemented B horizon that is lacking in the Windsor and Deerfield soils.

Saugatuck loamy sand (Sb).—This nearly level, somewhat poorly drained and poorly drained soil lies in flat

depressions on outwash plains. Areas are 5 acres to more than 100 acres in size. A hummocky, stone-free surface is a noticeable feature of this soil. The high water table keeps this soil wet 7 to 9 months of the year.

Included in mapping are areas of very poorly drained sandy soils and very poorly drained organic soils. Also included are some areas of soils that lack a cemented pan in most places, areas of soils that have a fine sandy loam surface layer, areas of soils that have layers of silt and clay in the substratum, and a few spots of soils that have gravel throughout the profile.

A high water table and a cemented pan in the subsoil restricts internal drainage and root penetration and limits plant growth. Outlets for drainage systems are difficult to obtain in the nearly level areas.

This soil is not suited to cultivated crops. It is poorly suited to hay and has limited value for pasture unless it is drained. Drainage is not generally economically feasible for hay and pasture use.

This soil is mostly forested or is idle. It generally provides suitable sites for dugout ponds and is suitable for development of woodland and wetland wildlife habitat. (Capability unit Vw–23)

Scantic Series

The Scantic series consists of poorly drained soils that formed in thick silt and clay marine deposits. These soils are nearly level to gently sloping in depressions that form long, irregular patterns on the landscape in the southeastern part of the county.

A representative profile of a Scantic soil in a plowed area has a dark-gray heavy silt loam surface layer 9 inches thick. The subsurface layer is mottled, gray light silt loam 4 inches thick. The next layer is about 23 inches thick. In the upper part, it is firm, olive-gray silty clay loam that contains reddish-brown mottles. In the lower part, it is olive-gray silty clay that contains strong-brown mottles. Below this to a depth of about 40 inches is firm, olive-gray silty clay that contains a few mottles.

Scantic soils are slowly permeable and have high available water capacity. Wetness and slow internal drainage are limitations for farm and most nonfarm uses.

Representative profile of a Scantic silt loam (slope of 2 percent) in a plowed area about 200 yards west of Back River Road and 260 yards north of U.S. Route 4 in Durham:

Ap—0 to 9 inches, dark-gray (10YR 4/1) heavy silt loam; weak, fine, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

A2g—9 to 13 inches, gray (5Y 5/1) light silt loam; common, fine, distinct, red (2.5YR 5/6) and strong-brown (7.5YR 5/8) mottles; moderate, fine, subangular blocky structure; firm; many roots; many very fine pores; slightly acid; clear, wavy boundary.

B21g—13 to 23 inches, olive-gray (5Y 4/2) silty clay loam; dark-gray (5Y 4/1) clay coatings on peds; common, fine, distinct, reddish-brown (2.5YR 4/4) mottles; moderate, fine, subangular blocky structure; firm; few roots; common, very fine pores; few black, manganeselike stains on ped faces; slightly acid; clear, wavy boundary.

B22g—23 to 36 inches, olive-gray (5Y 4/2) silty clay; gray (5Y 5/1) clay coatings on peds; few, fine, faint, strong-brown (7.5YR 5/6) mottles; strong, medium, angular blocky structure; very firm; common, black manganeselike stains on ped faces; neutral; clear, wavy boundary.

Cg—36 to 40 inches, olive-gray (5Y 4/2) silty clay; gray (5Y 5/1) clay coatings on ped faces; few, fine, faint, brown (7.5YR 5/4) mottles; weak, medium, angular blocky structure; firm; common, black manganeselike stains on ped faces; neutral.

Texture of the Ap horizon and of the upper part of the B horizon ranges from silt loam to silty clay loam. The A horizon is 4 or 5 in value and 1 or 2 in chroma. Hue of the A2g horizon is 2.5Y or 5Y. The lower part of the B horizon is silty clay loam or silty clay. The B horizon is 4 to 6 in value and 1 or 2 in chroma. Texture of the C horizon is silty clay or clay. The C horizon is 4 or 5 in value and 1 or 2 in chroma. Reaction in the upper part of the solum ranges from strongly acid to slightly acid. Reaction in the lower part of the solum and in the C horizon ranges from medium acid to neutral.

Scantic soils are near the Biddeford, Buxton, and Swanton soils. Scantic soils have a lighter colored A horizon and are better drained than the Biddeford soils. They are more poorly drained than the Buxton soils. The Scantic soils are similar to the Swanton soils in drainage but are finer textured in the upper part of the profile.

Scantic silt loam, 0 to 3 percent slopes (ScA).—This soil commonly lies in narrow strips adjacent to natural runs. It has the profile described as representative for the series. The water table is at or near the surface 7 to 9 months of the year.

Included in mapping are spots of Swanton and Biddeford soils and areas of Scantic soils that contain flat rock fragments in the substratum.

Poor drainage is a major concern of management. This soil is difficult to work because of wetness and slow internal drainage.

Unless this soil is artificially drained, it is not suited to row crops. If undrained areas are well managed, they are suited to water-tolerant grasses and legumes. Pastures should not be grazed when wet, because trampling puddles and compacts the soil and punctures the sod. If drainage is improved, the cropping system may consist of row crops, cover crops, and grasses and legumes in a rotation.

This soil is difficult to drain because it is slowly permeable. Bedding and land smoothing remove surface water and improve drainage. Extensive tile drainage systems are generally not feasible, because relatively close spacing of tile drains is needed.

Most areas of this soil are forested. A few areas are in unimproved pasture or are idle. Partially drained areas are used for hay and pasture. This soil is well suited to woodland and wetland wildlife habitat. (Capability unit IVw–33)

Scantic silt loam, 3 to 8 percent slopes (ScB).—This soil generally is adjacent to natural runs. It consists of about 12 inches of silt loam underlain by silty clay loam and silty clay to a depth of 40 inches or more. The water table is at or near the surface 7 to 9 months of the year.

Included in mapping are spots of Swanton soils and Scantic soils that have flat rock fragments in the substratum. Buxton soils, commonly on mounds, are also included.

Wetness and slow internal drainage are the most important problems in managing this soil. It is difficult to drain because it is slowly permeable. Drainage ditches are more feasible than tile. This soil puddles and becomes compacted if it is plowed or grazed when wet. The hazard of erosion is severe if vegetation is removed.

This soil is not suited to row crops unless it is artificially drained. If undrained areas are well managed, it is suited to water-tolerant grasses and legumes. If row crops are grown on the steeper slopes, cover crops, contour farming, stripcropping, or diversions are needed to help control erosion. Cropping systems generally include a combination of row crops and grasses and legumes in the rotation.

Most areas of this soil are in forest, are in unimproved pasture, or are idle. Some partially drained areas are used for hay and pasture. Slope is a limitation for developing wetland wildlife habitat. (Capability unit IVw-33)

Suffield Series

The Suffield series consists of well-drained soils that formed in thick deposits of silt and clay, mostly of marine origin. These soils are sloping to steep on dissected terrace breaks that are mostly in the southeastern part of the county. Common forest trees are white pine, hemlock, red oak, and sugar maple.

A representative profile of a Suffield soil in grass has a dark-brown silt loam surface layer 4 inches thick. The next layer is about 15 inches thick. In the upper part it is dark yellowish-brown silt loam, and in the lower part it is olive silt loam. Below this is a layer of olive-brown silty clay loam 9 inches thick. The underlying material, to a depth of about 41 inches, is firm light olive-brown silty clay.

Permeability is slow, and the available water capacity is high. Erosion is a major concern of management for most uses. Woodcrop production is good. Septic tank filter fields do not function well, because the substratum is slowly permeable.

Representative profile of a Suffield silt loam (slope of 12 percent) in an idle hayfield about nine-tenths mile west of the junction of Sixth Street and Central Avenue, 150 feet south of Sixth Street, in the City of Dover:

Ap—0 to 4 inches, dark-brown (10YR 3/3) silt loam; weak, fine, granular structure; very friable; many roots; strongly acid, abrupt, smooth boundary.

B21—4 to 10 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; friable; many roots; strongly acid; abrupt, wavy boundary.

B22—10 to 19 inches, olive (5Y 4/3) silt loam; weak, medium, granular structure; friable; common roots; medium acid; abrupt, wavy boundary.

IIB3—19 to 28 inches, olive-brown (2.5Y 4/4) ped faces, olive (5Y 5/3) ped interiors in silty clay loam; moderate, medium, subangular blocky structure; firm; few roots; medium acid; clear, wavy boundary.

IIC—28 to 41 inches, light olive-brown (2.5Y 5/4) ped faces, olive-brown (2.5Y 4/4) ped interiors in silty clay; weak, medium, prismatic structure breaking to moderate, medium, subangular blocky structure; firm; few roots; neutral.

Texture of the A horizon ranges from silt loam to loam. In cultivated areas the Ap horizon is 3 or 4 in value and 2 or 3 in chroma. The B21 and B22 horizons range from heavy silt loam to loam. The B21 horizon is 7.5YR to 2.5Y in hue, 4 or 5 in value, and 4 to 8 in chroma. The B22 horizon is 2.5Y or 5Y in hue, 3 to 5 in value, and 2 to 4 in chroma. The IIB3 horizon ranges from silt loam to silty clay loam, and the IIC horizon ranges from silty clay loam to silty clay. Black manganeselike stains are present on ped faces in the IIC horizon in some places. Reaction ranges from strongly acid to slightly acid in the upper part of the profile and from medium acid to neutral in the underlying moderately fine and fine material.

Suffield soils are near the Buxton and Scantic soils and the soils of the Windsor series, clay subsoil variant. Suffield, Buxton, and Scantic soils formed in similar materials, but the Suffield soils are better drained and lack the mottles that are in the Buxton and Scantic soils. Suffield soils are finer textured in the solum than the soils of the Windsor series, clay subsoil variant.

Suffield silt loam, 8 to 15 percent slopes (SfC).—This soil typically occupies short slopes in individual areas 10 to 50 acres in size. It has the profile described as representative for the series.

Included in mapping are areas of Buxton soils, areas of soils that have a high content of sand throughout the profile, and areas of well-drained soils that contain about 2 feet of fine sandy loam over silty clay. Also included are a few spots of Rock outcrop.

The hazard of erosion is a major management concern where this soil is under cultivation or is disturbed during construction work.

This soil is well suited to grasses, legumes, and small grains. If it is used for row crops, a cropping system should be chosen that holds soil losses to a minimum. Such a system requires use of contour farming, stripcropping, and diversions and inclusion of grasses and legumes in the rotation.

Most areas of this soil are in hay and pasture. Some areas are forested. This soil is well suited to most farming uses. The potential is good for the development of open-land and woodland wildlife habitat. (Capability unit IIIe-3)

Suffield silt loam, 15 to 35 percent slopes (SfE).—This soil typically occupies short slopes in dissected areas. Individual areas are 5 to 20 acres in size. This soil consists of 18 to 20 inches of silt loam underlain by silty clay loam and silty clay to a depth of 40 inches or more. In places some of the original surface layer has been lost through erosion.

Included in mapping are areas of soils that have a high sand content throughout the profile, areas of well-drained soils that contain about 2 feet of fine sandy loam over silty clay, and a few spots of Rock outcrop.

This soil is generally unsuited to row crops. It is well suited to hay, pasture, or woodcrop production. When forage crops need improvement, reseeding should be in strips and waterways should be left in sod to help control erosion.

This is one of the most erodible soils in the county, and permanent sod or forest cover is needed to maintain stability. It is too steep for most farm and nonfarm uses.

Most of this soil is forested, a use to which it is well suited. It has a fair potential for open-land and woodland wildlife habitat development. (Capability unit IVe-3)

Suncook Series

The Suncook series consists of nearly level, excessively drained soils that formed in thick, sandy and gravelly alluvial deposits. These soils are generally in narrow strips bordering streams and rivers, and they are often flooded. Elm, red maple, and willow are the dominant trees.

A representative profile of a Suncook soil in a plowed area has a very dark grayish-brown loamy sand surface layer 7 inches thick underlain by yellowish-brown and grayish-brown loamy sand to a depth of about 18 inches. Below this, to a depth of about 40 inches, is grayish-brown, loose medium sand.

These soils are rapidly permeable and are droughty. Frequent flooding and droughtiness are major concerns of management for most uses.

Representative profile of Suncook loamy sand (slope of 2 percent) in a plowed area 1 mile southeast of the village of Farmington, about 150 yards east of old State Route 11:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) loamy sand; weak, medium, granular structure; very friable; many fine roots; slightly acid; abrupt, smooth boundary.

C1—7 to 11 inches, yellowish-brown (10YR 5/4) loamy sand; weak, fine, granular structure; very friable; common fine roots; slightly acid; clear, wavy boundary.

C2—11 to 18 inches, grayish-brown (2.5Y 5/2) loamy sand; weak, fine, granular structure; very friable; few, fine roots; medium acid; abrupt, wavy boundary.

C3—18 to 40 inches, grayish-brown (10YR 5/2) medium sand; single grain; loose; medium acid.

Texture of the A horizon is loamy sand or loamy fine sand. The C horizon ranges from loamy sand to sand. In places lenses of fine sandy loam and gravel occur below a depth of 12 inches. Chroma of the C horizon ranges from 2 to 4. Reaction of the A horizon and underlying material is strongly acid to slightly acid.

Suncook soils occupy the same general landscape on the flood plains as Ondawa, Podunk, and Rumney soils. They are coarser textured than those soils and are better drained than the Podunk and Rumney soils.

Suncook loamy sand (Sk).—This excessively drained, nearly level soil occupies narrow strips adjacent to rivers and streams and is subject to seasonal flooding. Some areas of this soil in the town of Farmington are protected from flooding.

Included in mapping are a few small areas of Ondawa and Podunk soils and some areas of gravelly alluvial soils.

Because of droughtiness, this soil is not well suited to cultivated crops or to hay and pasture. It is generally kept in sod. Irrigation and large quantities of lime and fertilizer are needed for all crops. Adding manure and returning crop residue to the soil helps to maintain the organic-matter content of the soil. This soil occupies areas near other soils that are better suited to farming, and it is sometimes difficult to identify it for special management.

This soil has a low potential for farming unless it is irrigated and protected from flooding. Most areas are in hay or pasture. A few areas are forested. (Capability unit IIIs-16)

Sutton Series

The Sutton series consists of deep, moderately well drained loamy soils that formed in stony glacial till. Stones on the surface are common except in cleared fields. Typically, these soils are nearly level to gently sloping and occupy small depressions on uplands, mainly in the central part of the county.

A representative profile of a Sutton soil in a cultivated area has a surface layer that is very dark grayish-brown fine sandy loam about 6 inches thick. The subsoil, about 18 inches thick, is yellowish-brown fine sandy loam in the upper part and is mottled, light olive-brown fine sandy loam in the lower part. Below this, to a depth of about 40 inches, is mottled, olive fine sandy loam.

Sutton soils have moderate permeability and moderate available water capacity. These are among the best soils in the county for forestry. Seasonal wetness is a limitation for most nonfarm uses.

Representative profile of a Sutton fine sandy loam (slope of 2 percent) in a cultivated area on the south side of Sampson Road, 750 yards southeast of the junction of Four Rod Road and Sampson Road in Rochester:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; medium acid; abrupt, smooth boundary.

B21—6 to 14 inches, yellowish-brown (10YR 5/6) fine sandy loam; weak, fine, granular structure; friable; common roots; medium acid; clear, wavy boundary.

B22—14 to 24 inches, light olive-brown (2.5Y 5/6) fine sandy loam; common, fine, distinct, yellowish-brown (10YR 5/8) mottles; weak, fine, granular structure; friable; common roots; medium acid; abrupt, wavy boundary.

C—24 to 40 inches, olive (5Y 5/4) fine sandy loam; common, moderate, prominent, red (2.5YR 4/8) mottles; moderate, fine, granular structure; firm in place, friable when removed; few roots; 20 percent stones and cobblestones; strongly acid.

Texture of the A horizon is fine sandy loam or loam. The B horizon ranges from sandy loam to fine sandy loam. Hue in the B horizon is 10YR and 2.5Y, value is 4 to 8, and chroma is 4 to 6. Texture of the C horizon ranges from sandy loam to fine sandy loam. Hue is 2.5Y or 5Y. The C horizon is either massive or has weak to moderate, fine, granular structure. Consistence is friable to firm. Depth to distinct or prominent mottling ranges from 14 to 30 inches.

Sutton soils are near Charlton, Woodbridge, and Acton soils. Sutton and Charlton soils formed in similar material, but Sutton soils are not so well drained. Sutton soils are similar to Woodbridge soils in drainage, but they lack the very firm fragipan. Unlike Acton soils, Sutton soils typically have finer textured B and C horizons and have a lower content of coarse fragments in the profile.

Sutton fine sandy loam, 0 to 8 percent slopes (SnB).—This soil occupies small depressions and lower side slopes on uplands. Individual areas are 3 to 10 acres in size. This soil has the profile described as representative for the series. Depth to a seasonal water table ranges from 14 to 30 inches.

Included in the mapping are areas of Woodbridge and Acton soils and small areas of more sloping Sutton soils.

Seasonal wetness is a major concern of management for most uses. Drainage improves this soil for crop production and for nonfarm uses. Erosion is a hazard in the more sloping areas where this soil is under cultivation or the surface layer is disturbed by construction work.

This soil is suited to corn, small grains, grasses, and legumes. The long slopes in the steeper areas can be cropped continuously if this soil is drained and protected from erosion by the use of diversions and stripcropping. Cropping systems generally contain row crops, cover crops, and grasses and legumes in a rotation. Legumes on this soil are subject to damage by seasonal wetness.

Artificial drainage increases the choice of crops and allows earlier tillage. Most stones on the surface have been removed, but in places subsurface stones interfere

with tillage. Protection from grazing is advisable early in spring or when this soil is wet.

Where this soil is not drained, it is used mostly for hay and pasture. A few areas are used for residential, industrial, and recreational development. Good habitat is provided for open-land and woodland wildlife habitat. (Capability unit IIw–52)

Sutton very stony fine sandy loam, 0 to 8 percent slopes (SuB).—This soil occupies small depressions on uplands in individual areas 5 to 50 acres or more in size. It has a profile similar to that described as representative for the series, but the mineral surface layer is thinner and darker colored. Stones averaging 1 to 1½ feet in diameter are 5 to 30 feet apart and cover up to 3 percent of the surface. A seasonal water table is at a depth of 14 to 30 inches.

Included in mapping are areas of Woodbridge and Acton soils, areas of more sloping Sutton soils, areas of extremely stony Sutton soils, and spots of Leicester soils.

Because of stoniness, this soil is not suited to cultivated crops. Stoniness and seasonal wetness are limitations for some nonfarm uses. Cleared areas are subject to erosion in the steeper areas of this soil.

This soil is largely in forest or unimproved pasture. Some areas can be managed for improved pasture. There is a fair potential for woodland wildlife habitat. (Capability unit VIs–72)

Swanton Series

The Swanton series consists of deep, somewhat poorly drained and poorly drained soils that formed in 19 to 36 inches of loamy material and underlying silt and clay deposits, mostly of marine origin. These are nearly level to gently sloping soils on lowlands in the southeastern part of the county. The common vegetation is white pine, red maple, elm, gray birch, and alder.

A representative profile of a Swanton soil in a pastured area has a very dark grayish-brown fine sandy loam surface layer 8 inches thick. This overlies olive-gray fine sandy loam that is 3 inches thick and contains dark yellowish-brown mottles. The next layer, about 8 inches thick, is gray very fine sandy loam that contains yellowish-brown mottles. Below this, to a depth of about 26 inches, is olive silty clay loam that contains strong-brown mottles. The underlying material, to a depth of about 41 inches, is olive silty clay that contains yellowish-red and gray mottles.

Swanton soils have a high water table much of the year. Permeability of the substratum is slow. The high water table limits soil air, severely restricts plant growth, and causes the soils to warm slowly in spring.

Representative profile of a Swanton fine sandy loam (slope of 2 percent) in a pastured area 450 yards northwest of Madbury-Durham town line on State Route 108 in the town of Madbury:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; many roots; medium acid; abrupt, smooth boundary.

B2g—8 to 11 inches, olive-gray (5Y 5/2) fine sandy loam; common, medium, prominent, dark yellowish-brown (10YR 4/4) mottles; weak, fine, granular structure; friable; common roots; medium acid; clear, wavy boundary.

A'2g—11 to 19 inches, gray (5Y 5/1) very fine sandy loam; common, medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, medium, granular structure; friable; common roots; medium acid; clear, wavy boundary.

IIB'2g—19 to 26 inches, olive (5Y 5/3) silty clay loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, subangular blocky structure; firm; thin clay films and few dark stains on peds and in pores; few roots; slightly acid; abrupt, wavy boundary.

IICg—26 to 41 inches, olive (5Y 5/3) silty clay; common, medium, prominent, yellowish-red (5YR 4/8) mottles and common, medium, faint, gray (5Y 5/1) mottles; weak, medium, subangular structure; firm; few, fine, dark stains on ped faces; slightly acid.

Texture of the Ap, B2g, and A'2g horizons ranges from very fine sandy loam to sandy loam. The B2g and A'2g horizons range from 10YR to 5Y in hue and from 3 to 5 in value. Texture of the IIB'2g and IICg horizons ranges from silty clay loam to clay. Hue is 2.5Y or 5Y, value is 4 or 5, and chroma is 1 to 3. Depth to mottling ranges from 7 to 12 inches, and the depth to the underlying moderately fine and fine material generally ranges from 19 to 36 inches. Reaction in the Ap and B2g horizons ranges from strongly acid to medium acid, and reaction of the underlying material ranges from medium acid to neutral.

Swanton soils formed in material similar to that in which Elmwood soils formed, but they are more poorly drained. Swanton soils are somewhat similar to Scantic soils in drainage but have a coarser texture in the upper part of the profile.

Swanton fine sandy loam, 0 to 3 percent slopes (SwA).—This soil lies in depressions on marine terraces. Areas are generally 10 to 60 acres or more in size. This soil has the profile described as representative for the series.

Included in mapping are areas of Scantic soils, areas of soils where the depth to silty clay is more than 40 inches, and areas of very poorly drained soils that have between 19 and 39 inches of fine sandy loam over silty clay. Also included are areas of poorly drained loamy sands and sands over silt and clay deposits.

Wetness and slow internal drainage are the major concerns in managing this soil. It is difficult to drain or to till. To prevent puddling and compaction, plowing and grazing should be delayed until the soil has dried. Except in areas of sandy over clayey material, surface field ditches and land smoothing are more feasible than tile drainage (fig. 11).

In its natural condition, this soil is suited to adapted varieties of hay and pasture plants. Where it is artificially drained, cropping systems generally include row crops, cover crops, and grasses and legumes in the rotation.

Where this soil is not drained, it is mostly forested or is idle. Wetness is a severe limitation to use of this soil for community development. It is well suited to woodland and wetland wildlife habitat. (Capability unit IIIw–43)

Swanton fine sandy loam, 3 to 8 percent slopes (SwB).—This gently rolling soil lies in slight depressions on marine terraces. Individual areas are 10 to 30 acres in size. This soil has a profile similar to that described as representative for the series, but it has a slightly thinner surface layer.

Included in mapping are areas of Elmwood soils, areas of poorly drained loamy sands, areas of poorly drained soils that have sands over silt and clay deposits, and areas

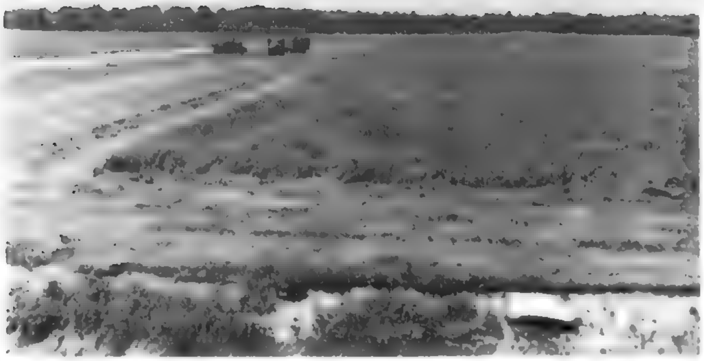

Figure 11.—**Well-managed hayfield of Swanton fine sandy loam, 0 to 3 percent slopes. Drainage has been improved by a system of surface field ditches and land smoothing.**

of poorly drained soils where the depth to silt and clay deposits is more than 40 inches.

Wetness and slow internal drainage are the main concerns in managing this soil. Bedding and open ditches improve drainage. Drainage outlets are more easily located in this soil than in the soil described as representative for the series. Tile drains are not generally practical, because of the slowly permeable substratum. This soil is subject to erosion when it is stripped of protective vegetation.

In its natural condition, this soil is suited to adapted varieties of hay and pasture plants. Where artificial drainage is used, cropping systems generally include row crops, cover crops, and grasses and legumes in the rotation. To control erosion, cover crops, contour farming, stripcropping, and diversions may be needed where row crops are grown on the steeper slopes.

Most areas of the soil are not drained and are used for forestry or are idle. This soil has severe limitations for community development. Slope is a limitation in developing wetland wildlife habitat. (Capability unit IIIw–43)

Tidal Marsh

Tidal marsh (Ta) occupies tidal flats that are covered with shallow water at high tide. It occurs in the southeastern part of the county in narrow fringes or in small inlets adjacent to Great Bay, Little Bay, and the Oyster, Bellamy, Piscataqua, and Salmon Falls Rivers (fig. 12).

The surface layer of Tidal marsh is a brown, fibrous mat of grass and grass roots with sand and silt intermixed. Below this, the material is generally dark-gray fine sandy loam or sand that is firm when in place but is loose and friable when removed. This grades to loose gray sand that is 2½ to 3 feet in depth. The vegetation is mainly saltgrass, eelgrass, and sedges.

Included in mapping are scattered small spots of Rock outcrop.

This land type has little or no value for farming. The best use is for wetland wildlife habitat. A few areas have been filled. Such areas are classified as Made land. (Capability unit VIIIw–89)

Whitman Series

The Whitman series consists of deep, very poorly drained, stony soils in depressions on nearly level uplands throughout the county. These soils formed in loamy glacial till. They have a very firm fragipan at a depth of 34 inches. The vegetation commonly consists of alder, gray birch, red maple, sedges, rushes, and cattails.

A representative profile of a Whitman soil in a forested area has a layer of fresh leaves and plant roots about 2 inches thick overlying a mineral surface layer of black fine sandy loam 3 inches thick. Below this is a subsurface layer about 14 inches thick that is gray very fine sandy loam in the upper part and dark-gray sandy loam in the lower part. Below this layer to a depth of about 41 inches is gray gravelly sandy loam that contains yellowish-red mottles. Beginning at a depth of about 34 inches is a pan layer that is very firm and hard to dig with a spade.

Whitman soils have a high water table at or near the surface most of the year, and in places they are ponded during wet seasons. Permeability is moderately slow. Because these soils are very poorly drained, most areas are in trees that are water tolerant. Wetness is a major limitation for most uses.

Representative profile of Whitman very stony fine sandy loam (slope of 1 percent) in a forested area one-fourth mile northwest of the junction of Range Road and Province Road in the town of Strafford:

O1—2 inches to 0, fresh alder leaves and plant roots.

A1—0 to 3 inches, black (10YR 2/1) fine sandy loam; weak, fine, granular structure; very friable; many roots; some stones on surface; medium acid; abrupt, smooth boundary.

A21g—3 to 7 inches, gray (5Y 5/1) very fine sandy loam; weak, medium, granular structure; friable; common roots; medium acid; clear, wavy boundary.

A22g—7 to 17 inches, dark-gray (5Y 4/1) sandy loam; massive; friable; few roots; medium acid; clear, wavy boundary.

B2g—17 to 34 inches, gray (5Y 5/1) gravelly sandy loam; common, medium, distinct, yellowish-red (5YR 4/6) mottles; massive; firm; 20 to 25 percent subangular rock fragments, mostly 4 to 12 inches in size; medium acid; clear, wavy boundary.

Cxg—34 to 41 inches, gray (5Y 5/1) gravelly sandy loam; common, medium, distinct, yellowish-red (5YR 4/6) mottles; massive; very firm; 20 to 25 percent subangular rock fragments, mostly 4 to 6 inches in size; medium acid.

Texture of the A1 horizon is generally fine sandy loam, loam, or silt loam. In places a layer of muck as much as 12 inches thick is at the surface. The A1 horizon is black or very dark brown. The chroma of gleyed horizons is 0 to 1. The texture below the A1 horizon, to a depth of 17 inches, ranges from very fine sandy loam to sandy loam. The fragipan ranges from sandy loam to loamy sand or their gravelly analogs. Mottles are generally lacking or are few and fine, but in places they increase in size and abundance below a depth of about 15 inches.

The Whitman soils are near the Ridgebury and Leicester soils. They formed in material similar to that in which those soils formed, but they are more poorly drained and their surface layer typically is slightly darker. Whitman soils have a very firm fragipan that is lacking in the Leicester soils.

Whitman very stony fine sandy loam (Wa).—This nearly level, very poorly drained soil is in low, wet areas on uplands. Stones on the surface average 1 to 1½ feet in diameter, are 5 to 30 feet apart, and cover up to 3 percent of the surface.

Figure 12.—Area of Tidal marsh.

Included in mapping are areas of very poorly drained soils that formed in glacial till and have no fragipan; areas of very poorly drained and poorly drained soils that formed in sand and gravel deposits; spots of Muck and peat; and scattered, small, extremely stony areas of soils.

This soil is too wet and stony for crops. It is largely in forest or is idle. A few small areas are used for unimproved pasture. Potential for dugout ponds and for wetland and woodland wildlife habitat is good. (Capability unit VIIs–74)

Windsor Series

The Windsor series consists of excessively drained, stone-free soils that formed in thick deposits of sands on plains and terraces. These soils are mainly in areas next to the Cocheco and Salmon Falls Rivers and on the Barrington and Somersworth sand plains. They are nearly level to gently sloping in most areas, but they are sloping to very steep on terrace breaks.

A representative profile of a Windsor soil in a cultivated area has a very dark grayish-brown loamy sand surface layer 6 inches thick. The upper part of the subsoil is dark-brown and yellowish brown loamy sand that extends to a depth of about 16 inches. The lower part of the subsoil, to a depth of about 25 inches, is loose, yellowish-brown medium sand. The underlying material to a depth of about 68 inches is light yellowish-brown and light olive-brown loose sand and very friable loamy fine sand.

Windsor soils are rapidly permeable and have very low available water capacity. There are no serious limitations for most nonfarm uses.

Representative profile of a Windsor loamy sand (slope of 1 percent) in a forested area in Rollinsford, 300 yards southeast of the junction of Depot Road and Roberts Road, three-fourths mile northwest of State Route 9.

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) loamy sand; weak, fine, granular structure; very friable; many roots; very strongly acid; abrupt, wavy boundary.

B21—6 to 10 inches, dark-brown (7.5YR 4/4) loamy sand; massive; very friable; common roots; strongly acid; clear, wavy boundary.

B22—10 to 16 inches, yellowish-brown (10YR 5/4) loamy sand; massive; very friable; common roots; strongly acid; clear, wavy boundary.

B3—16 to 25 inches, yellowish-brown (10YR 5/4) medium sand; single grain; loose; few roots; strongly acid; clear, wavy boundary.

C1—25 to 33 inches, light yellowish-brown (10YR 6/4) medium sand; single grain; loose; few roots; strongly acid; clear, wavy boundary.
C2—33 to 48 inches, light yellowish-brown (2.5Y 6/4) medium sand; massive; very friable; few roots; strongly acid; clear, wavy boundary.
C3—48 to 55 inches, light olive-brown (2.5Y 5/4) loamy fine sand; lenses of silty clay loam ½ inch thick at a depth of about 54 inches; concentration of fine roots on top of lens; massive; very friable; medium acid; clear, wavy boundary.
C4—55 to 68 inches, light yellowish-brown (2.5Y 6/4) medium sand; single grain; loose; some staining along old root channels; medium acid.

Texture of the A horizon is loamy sand or loamy fine sand. Texture of the B horizon ranges from loamy sand to sand. The B21 horizon is 7.5YR and 10YR in hue, 4 to 6 in value, and 4 to 8 in chroma. The B22 and B3 horizons range from 10YR to 2.5Y in hue, from 5 to 7 in value, and from 3 to 6 in chroma. The C horizon is mostly medium and fine sand. It ranges from 10YR to 2.5Y in hue, 5 to 7 in value, and 1 to 4 in chroma. Gravel-size coarse fragments make up less than 5 percent by volume of the B horizon and less than 10 percent of the C horizon.

Windsor soils are near Deerfield and Hinckley soils and less commonly are near Gloucester soils on adjacent uplands. Parent material of the Windsor soils and Deerfield soils is similar, but Windsor soils are better drained and lack the mottles characteristic of the Deerfield soils. Unlike Hinckley soils that formed in sand and gravel and Gloucester soils that formed in sandy and stony glacial till, Windsor soils have little or no gravel, cobblestones, or stones within the profile.

Windsor loamy sand, 0 to 3 percent slopes (WdA).—This soil commonly occupies small plains scattered throughout the county. It has the profile described as representative for the series. In places in the southeastern part of the county, this soil is underlain by silt and clay at a depth of more than 40 inches.

Included in mapping are areas of Deerfield soils and of gravelly Hinckley soils. Also included are a few areas of soils that formed mainly in medium and coarse sand.

Droughtiness and low natural fertility are major limitations to crop production. This soil warms early in spring and is generally easy to till.

This soil has limited suitability for row crops, hay, or pasture. Irrigation and large amounts of fertilizer are needed for optimum production of most crops (fig. 13). Cropping systems generally contain cover crops, grasses, and legumes in the rotation. Adding manure and returning crop residue to the soil help to maintain the organic-matter content of this soil.

Most areas of this soil are forested or are idle. Some areas are used for residential and industrial development, a use to which they are better suited than the more sloping Windsor soils. (Capability unit IIIs-26)

Windsor loamy sand, 3 to 8 percent slopes (WdB).—This undulating soil lies in small areas on terraces adjacent to major streams. It consists of loamy sands and sands to a depth of 50 inches. In the southeastern part of the county, this soil is underlain by silts and clays at a depth of more than 40 inches.

Included in the mapping are spots of Hinckley and Deerfield soils and areas of soils that consist mainly of medium and coarse sand.

Because of droughtiness and low natural fertility, this soil is poorly suited to row crops, hay, or pasture unless it is irrigated and otherwise well managed. Unprotected areas are subject to soil blowing and water erosion.

Figure 13.—High-quality truck crop being irrigated on Windsor loamy sand, 0 to 3 percent slopes.

Irrigation and large amounts of fertilizer are required for optimum production of most crops. Cropping systems generally include cover crops and grasses and legumes in the rotation. In long, sloping areas, stripcropping helps to conserve moisture and minimize soil losses. Adding manure annd returning crop residue help to maintain the organic-matter content of this soil.

This soil is mostly forested. There are a few cultivated areas, and some areas are used for residential and industrial development. Droughtiness is a major problem in establishing and maintaining grass cover. (Capability unit IIIs-26)

Windsor loamy sand, 8 to 15 percent slopes (WdC).—This soil generally occupies short slopes of terraces. It has a profile similar to that described as representative for the series, but it has a thinner surface layer. In some places in the southeastern part of the county, this soil is underlain by silt and clay at a depth of more than 50 inches.

Included in mapping are small areas of Hinckley soils and areas of soils that are mainly medium and coarse sand.

Droughtiness is a severe limitation for crop production. Irrigation improves plant growth. Areas under cultivation and areas disturbed during construction work are subject to erosion. This soil is subject to gullying and soil blowing. Both of these hazards can be controlled by use of intensive erosion control measures. Adding manure and returning crop residue help to maintain the organic-matter content of this soil. Nutrients leach from the soil rapidly, and frequent applications of lime and fertilizer are necessary.

This soil is better suited to drought-resistant grasses and legumes than to row crops. Irrigation is required for optimum production of most crops. If this soil is used for row crops, a cropping system should be selected that holds soil losses to a minimum. This requires cover crops and grasses and legumes in the rotation. Supporting erosion control practices are contour farming, stripcropping, and diversions.

Most areas of this soil are forested. Some less sloping areas are favorable for community development, but

development costs may be greater than on less sloping Windsor soils. (Capability unit IVs-26)

Windsor loamy sand, 15 to 60 percent slopes (WdE).—This soil typically lies on terrace breaks beside major streams in the county. The profile of this soil is similar to that described as representative for the series, but part of the original surface layer has been lost through erosion.

Included in mapping are small areas of gravelly Hinckley soils.

Steepness and droughtiness are major limitations to most uses of this soil. The hazard of erosion is severe where protective vegetation is removed.

This soil is not suitable for row or hay crop production. It is mainly forested, but timber management is limited by the short, steep slopes. A good cover of sod or forest vegetation is needed to control erosion. This soil is a potential source of sand for borrow material. (Capability unit VIIs-26)

Windsor Series, Clay Subsoil Variant

The Windsor series, clay subsoil variant, consists of well-drained, stone-free soils that formed in more than 18 inches and less than 30 inches of sandy material and the thick underlying silt and clay deposits, mostly of marine origin. These nearly level to sloping soils are on marine terraces, mostly in the southeastern part of the county.

A representative profile of a Windsor soil, clay subsoil variant, in a cultivated area has a very dark grayish-brown loamy fine sand surface layer 10 inches thick. The next layer extends to a depth of 24 inches and is yellowish-brown loamy fine sand in the upper part and light olive-brown fine sand in the lower part. The next series of layers extends to a depth of about 42 inches. In sequence from the top, the upper 2 inches is olive, firm very fine sandy loam, the next 4 inches is olive silt loam, and the lower 12 inches is very firm, olive-gray silty clay loam.

Soils of the Windsor series, clay subsoil variant, have moderately slow permeability and moderate available water capacity. Septic tank filter fields do not function well, because the subsoil has moderately slow permeability.

Representative profile of a Windsor loamy fine sand, clay subsoil variant (slope of 5 percent) in a hayfield about four-tenths mile southeast of the Grange Hall on Lee Hook Road in the town of Lee:

Ap—0 to 10 inches, very dark grayish-brown (10YR 3/2) loamy fine sand; weak, fine, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

B21—10 to 16 inches, yellowish-brown (10YR 5/6) loamy fine sand; single grain; loose; common roots; medium acid; clear, wavy boundary.

B22—16 to 24 inches, light olive-brown (2.5Y 5/4) fine sand; single grain; loose; few roots; medium acid; abrupt, smooth boundary.

IIA'2—24 to 26 inches, olive (5Y 4/3) very fine sandy loam; weak, thin, platy structure; firm; few roots; medium acid; clear, wavy boundary.

IIC1—26 to 30 inches, olive (5Y 5/3) silt loam; moderate, fine and medium, angular blocky structure; firm; few roots; medium acid; clear, wavy boundary.

IIC2—30 to 42 inches, olive-gray (5Y 5/2) silty clay loam; gray (5Y 5/1) clay coatings on peds; moderate, coarse, prismatic structure; very firm; many fine, dark manganeselike stains along channels; many fine pores; medium acid.

The A horizon texture is loamy sand or loamy fine sand. Hue is 10YR, value is 3 or 4, and chroma is 2 to 4. The B horizon ranges from loamy sand to sand. The upper part of the B horizon has a hue of 7.5YR to 2.5Y; a value of 3 to 5; and a chroma of 3 to 6. The lower part of the B horizon has a hue of 10YR or 2.5Y. The IIC horizon ranges from silt loam to silty clay. Hue is 2.5Y or 5Y, and value is 4 to 6. Reaction of the sandy upper horizons is strongly acid to medium acid. In the underlying material, reaction ranges from strongly acid to slightly acid.

Soils of the Windsor series, clay subsoil variant, are near Elmwood, Buxton, and Windsor soils. They are better drained and have coarser textures in the upper part of the profile than Elmwood or Buxton soils. They resemble sandy Windsor soils, except for the presence of silt and clay deposits at a depth of about 2 feet.

Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes (WfB).—This gently rolling soil occupies small areas on marine or lacustrine terraces. It has the profile described as representative of the series.

Included in mapping are areas of moderately well drained soils that formed in the same soil material as this soil.

Because of the sandy nature of the surface layer and the upper part of the subsoil, row crops and grasses suffer in some places from lack of moisture during dry periods; however, this soil retains more moisture available to crops than the droughty Windsor loamy sands. Erosion is a hazard in the more sloping areas. The moderately slowly permeable subsoil is a limitation to use of this soil for residential and industrial development.

The soil is easily cultivated and generally produces satisfactory growth of corn, truck crops, small grain, grasses, and legumes. Erosion control practices include diversions, contour farming, and stripcropping. Cropping systems generally include row crops, cover crops, and grasses and legumes in the rotation. Adding manure and returning crop residue to the soil help to maintain soil tilth, provide additional organic matter, and conserve moisture.

About half the acreage of this soil is forested. The rest is used for truck crops, hay, and pasture. The potential for developing open-land and woodland wildlife habitat is good. (Capability unit IIs-4)

Windsor loamy fine sand, clay subsoil variant, 8 to 15 percent slopes (WfC).—This soil is in rolling areas on marine or lacustrine terraces. It consists of about 2 to 2½ feet of loamy fine sand and fine sand over silty clay loam and silty clay.

Included in mapping are some areas of soils where depth to silt and clay deposits is greater than 40 inches.

Erosion is a hazard if the surface layer is disturbed during cultivation or construction work. Droughtiness is also a limitation to crop production. Slope and the moderately slowly permeable subsoil are limitations to use for residential and industrial development.

This soil is suited to most general crops, but its use is limited by slope and the hazard of erosion. Diversions, contour farming, and stripcropping are needed to control erosion if it is used for row or truck crops (fig. 14). These practices are also needed in cropping systems that include cover crops and grasses and legumes in the

Figure 14.—**Stripcropping on Windsor loamy fine sand, clay subsoil variant, 8 to 15 percent slopes. Field to the right of pond is terraced and tilled on the contour.**

rotation. Adding manure and returning crop residue to the soil help to maintain soil tilth, provide additional organic matter, and conserve moisture.

This soil is mostly forested or is in hay of low quality. A few areas are cultivated or are in pasture during dry periods. This soil has good potential for the development of open-land and woodland wildlife habitat. (Capability unit IIIe-4)

Woodbridge Series

The Woodbridge series consists of deep, moderately well drained loamy soils that have distinct or prominent fragipans. These soils formed in compact glacial till. Stones are common throughout the profile. These soils are nearly level to sloping and are common in the central, western, and northern parts of the county, where they typically lie on crests and sides of drumlins. White pine, red oak, sugar maple, and hemlock are the common trees on these soils.

In a representative profile of a Woodbridge soil in a cultivated area, the surface layer is dark-brown fine sandy loam about 7 inches thick. The subsoil is about 11 inches thick and is dark yellowish-brown fine sandy loam in the upper part and is mottled, yellowish-brown fine sandy loam in the lower part. The next series of layers extends to a depth of about 42 inches. In sequence from the top, the upper 3 inches is friable, mottled, olive fine sandy loam; the next 5 inches is olive, firm fine sandy loam that contains reddish-brown mottles; and the lower 16 inches is a mottled, olive, very firm gravelly fine sandy loam fragipan that is hard to dig with a spade.

Woodbridge soils have moderately slow permeability and moderate available water capacity. They are often wet in spring and late in fall.

These are some of the best soils in the county for timber production.

Representative profile of a Woodbridge fine sandy loam (slope of 2 percent) one-half mile east of Baxter Lake in hayfield 450 yards south of junction of Ten Rod Road and Four Rod Road:

Ap—0 to 7 inches, dark-brown (10YR 3/3) fine sandy loam; weak, fine, granular structure; very friable; many roots; medium acid; abrupt, smooth boundary.

B21—7 to 13 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, medium, granular structure; friable; common roots; medium acid; clear, wavy boundary.

B22—13 to 18 inches, yellowish-brown (10YR 5/4) fine sandy loam; common, medium, distinct, brown (7.5YR 4/4) mottles; weak, medium, granular structure; friable; common roots; medium acid; clear, wavy boundary.

A'2—18 to 21 inches, olive (5Y 5/3) fine sandy loam; common, medium, distinct, brown (7.5YR 4/4) mottles; weak, medium, granular structure; friable; few roots; 5 percent subangular rock fragments 2 to 3 inches in size; medium acid; clear, wavy boundary.

C1—21 to 26 inches, olive (5Y 4/3) fine sandy loam; common, medium, prominent, reddish-brown (5YR 4/4) mottles; moderate, thin, platy structure; firm; 15 percent subangular rock fragments, mostly 2 to 3 inches in size; medium acid; clear, wavy boundary.

C2x—26 to 42 inches, olive (5Y 5/3) gravelly fine sandy loam; common, medium, prominent, reddish-brown (5YR 4/4) mottles; moderate, thin, platy structure; very firm; light brownish-gray (2.5Y 6/2), polygonal streaks; 25 percent subangular rock fragments; mostly 1 to 2 inches in size; medium acid.

The texture of the Ap horizon is generally loam and fine sandy loam. The B horizon is fine sandy loam and sandy loam. It is 7.5YR or 10YR in hue, 3 to 5 in value, and 2 to 4 in chroma. Texture of the A'2 horizon ranges from fine sandy loam to loamy sand. The upper part of the C horizon and the fragipan range from sandy loam to loam. The C horizon is 2.5Y or 5Y in hue, 3 to 5 in value, and 1 to 4 in chroma. The depth to the fragipan ranges from 16 to 36 inches. The depth to distinct mottling ranges from 12 to 30 inches.

Woodbridge soils are near Paxton and Ridgebury soils, and they formed in similar material. Woodbridge and Paxton soils are similar, but Paxton soils lack mottles in the lower part of the B horizon. Woodbridge soils have fewer mottles in the B and C horizons and are better drained than Ridgebury soils. Woodbridge soils have a finer textured C horizon than Acton soils, which are also nearby, and contain fewer coarse fragments in the upper part of the profile.

Woodbridge fine sandy loam, 0 to 8 percent slopes (WgB).—This soil typically lies in small areas on the crests of drumlins. It has the profile described as representative for the series. Some stones, cobblestones, and gravel are in the profile. A water table is at a depth of 12 to 30 inches both early and late in spring.

Included in mapping are areas of Sutton and Ridgebury soils and areas of soils that are moderately well drained and have a loamy sand subsoil and fragipan. Areas of Paxton soils are also included in a few places.

Wetness is the major limitation to most uses of this soil. Water tends to pond for short periods in the nearly level areas. Erosion control is needed in the more sloping areas.

This soil is suited to cultivated crops and is well suited to small grain, grasses, and legumes. Legumes should be winter-hardy and able to withstand seasonal wetness. If the gently sloping areas are drained and used extensively for row crops, diversions and stripcropping are needed to control erosion. These practices are often used with cropping systems that include grasses and legumes in the rotation. Cover crops are also used after row crops.

This soil is wet in spring and late in fall and for short periods after heavy rains. Artificial drainage permits a wider choice of crops, earlier tillage, and more intensive cropping. Most stones on the surface have been removed, but in a few places stones below the surface may interfere with tillage.

Most areas of this soil are used for hay and pasture. Some areas are forested. Seasonal wetness and slow internal drainage are severe limitations to use for residential and industrial development. (Capability unit IIw-62)

Woodbridge very stony fine sandy loam, 0 to 8 percent slopes (WsB).—This soil commonly lies in areas near the crests of drumlins. It has a profile similar to that described as representative for the series, but the surface layer is thinner and darker colored. Stones on the surface average 1 to 1½ feet in diameter. They are 5 to 30 feet apart and cover up to 3 percent of the surface. A water table is at a depth of between 12 and 30 inches both early and late in spring.

Included in mapping are areas of Paxton, Sutton, and Ridgebury soils, areas of moderately well drained soils that have a loamy sand subsoil and pan layer, and spots of extremely stony soils that are similar to those of the Woodbridge series.

Stones on the surface and seasonal wetness are limitations to most uses of this soil. Water tends to pond for short periods in the nearly level areas, and the more sloping cleared areas are subject to erosion.

Because of the stones on the surface, this soil is not suitable for cultivation. Some areas are managed for improved pasture, but most areas are forested. Scattered small areas have been cleared and are used for unimproved pasture or are idle. This soil is better suited to forestry than to most other uses. Seasonal wetness and moderately slow permeability are severe hazards if this soil is used for residential and industrial development. (Capability unit VIs-72)

Woodbridge very stony fine sandy loam, 8 to 15 percent slopes (WsC).—This soil commonly occupies the sides of drumlins. It has a profile similar to that described as representative for the series, but the surface layer is thinner and darker colored. Stones and gravel-size fragments are scattered throughout the profile. Stones on the surface average 1 to 1½ feet in diameter, are 5 to 30 feet apart, and cover up to 3 percent of the surface. A water table is at a depth of between 12 and 30 inches both early and late in spring.

Included in mapping are areas of Paxton and Sutton soils, areas of more sloping soils, and spots of extremely stony soils that are similar to those of the Woodbridge series.

Stoniness and seasonal wetness are major limitations to most uses. Water moves over the pan layer and comes to the surface downslope as seep spots. Cleared areas are subject to erosion.

This soil is mostly forested, a use to which it is well suited. It is not suitable for cultivation, because of surface stoniness. Some areas can be managed for improved pasture. Use of this soil for residential and industrial development is limited because of seasonal wetness, moderately slow permeability, and slopes. (Capability unit VIs-72)

Use and Management of the Soils

This section discusses the use and management of the soils for farming, woodland, wildlife, engineering, recreation, and community development. Additional suggestions for the use and management of each soil are given in the section "Descriptions of the soils."

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For more detailed information, consult the local office of the Strafford County Agricultural Extension Service or Soil Conservation Service or inquire at the New Hampshire Experiment Station at Durham, New Hampshire.

Soils in Farming

The soils of Strafford County vary widely in their suitability for plants and in the kind of management needed. Surface texture ranges from silty clay loam to gravelly loamy sand. Some of the soils are well supplied with organic matter; some are not. Some need artificial drainage if they are used for cultivated crops. Most of them need lime and fertilizer but in different amounts.

The tilth of the surface soil and the supply of plant nutrients are very important. The subsoil also must furnish some nutrients and a great deal of water. The sandy and gravelly subsoil of the droughty, Hinckley and Windsor soils, for example, can supply only a small amount of nutrients and water for plant growth. In contrast, the loamy subsoil of the Charlton and Paxton soils can supply adequate amounts of nutrients and water for most crops.

Many soil properties affect crop growth. Recognizing these specific characteristics and qualities is important in planning soil use and management. Some soil properties can be improved. For example, acid soils can be limed so that alfalfa can be grown. Some naturally wet soils, such as Saugatuck loamy sand, can be drained to improve aeration and permit early preparation of seedbeds. Soils that are naturally low in organic-matter content can be improved by applications of manure. Irrigation can correct moisture deficiencies in soils such as Windsor loamy sand.

Other soil properties are not so easily changed. Slope and the physical characteristics of the subsoil, for example, are things we more or less have to live with, but erosion and excess runoff can be controlled and tilth can be improved by terracing the slopes, keeping waterways in sod, and using suitable cropping systems.

It is important to know the problems of managing each soil, because no single cropping system, fertilizer treatment, or erosion control plan is good for all the soils in the county. Practices that are good on one farm may not be good on an adjoining farm. There are many differences among soils, and different management plans are needed to get the best yields.

Capability grouping of soils

The capability classification is a grouping that shows, in a general way, how suitable soils are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this classification system, all the kinds of soil are grouped at three levels: the capability class, subclass, and unit. The eight *capability classes*, the broadest groups, are designated by Roman numerals I through VIII. In class I, the soils have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. The soils and landforms in class VIII are so rough, shallow, or otherwise limited that they do not produce worthwhile amounts of crops, forage, or wood products.

The *capability subclasses* indicate major kinds of limitations within the classes. Within most of the classes there can be up to four subclasses. The subclass is indicated by adding a small letter *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil will interfere with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the country but not in Strafford County, indicates that the chief limitation is climate that is too cold or too dry.

Class I has no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it are subject to little or no erosion. This class has other limitations, however, that restrict use largely to pasture, range, woodland, or wildlife.

Capability units within the subclasses are soil groups that are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are identified by an Arabic numeral added to the subclass designator; for example, IIe–5 or IIIe–6. The capability unit numbers are generally assigned locally but are part of a statewide system.

Soils are placed in capability classes, subclasses, and units according to the type and degree of their permanent limitations, but without consideration of possible but unlikely major reclamation projects or major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil.

In this survey use and management of soils are discussed in the descriptions of mapping units in the section "Descriptions of the Soils" rather than by capability units.

The eight classes in the capability system and the subclasses and capability units in this county are described in the list that follows. Because the capability classification of soils in Strafford County is part of a statewide system, all of the capability units in the system do not occur in this county. Consequently, capability unit numbers in the list are not consecutive.

Class I. Soils that have few limitations that restrict their use.

- Capability unit I–1.—Deep, well-drained, nearly level fine sandy loams on flood plains that are seldom flooded.

Class II. Soils that have some limitations that reduce the choice of plants or require conservation practices.

- Subclass IIe. Soils subject to moderate erosion if they are not protected.
  - Capability unit IIe–5.—Deep, well-drained, gently sloping loamy soils formed in thick glacial till on uplands.

Capability unit IIe-6.—Deep, well-drained, nearly level to gently sloping loamy soils formed in compact glacial till on rounded hills of the uplands.

Subclass IIw. Soils that have moderate limitations because of excess water.

Capability unit IIw-12.—Deep, moderately well drained, nearly level soils on flood plains. These soils are subject to flooding.

Capability unit IIw-32.—Deep, moderately well drained to somewhat poorly drained, nearly level to gently sloping soils formed in silts and clays of marine origin.

Capability unit IIw-42.—Deep, moderately well drained, nearly level to gently sloping soils that have about 1½ to 2 feet of fine sandy loam and loamy fine sand over silt and clay marine deposits.

Capability unit IIw-52.—Deep, moderately well drained, nearly level to gently sloping soils formed in sandy and loamy glacial till on uplands.

Capability unit IIw-62.—Deep, moderately well drained, nearly level to gently sloping soils formed in compact glacial till on uplands.

Subclass IIs. Soils that have moderate limitations because of available water capacity.

Capability unit IIs-4.—Deep, well-drained, nearly level to gently sloping soils that have 2 to 2½ feet of loamy fine sand and fine sand over silt and clay marine deposits.

Capability unit IIs-55.—Deep, somewhat excessively drained, gently sloping soils formed in sandy glacial till on uplands.

Class III. Soils that have severe limitations that reduce the choice of plants or require special conservation practices, or both.

Subclass IIIe. Soils that are subject to severe erosion if they are cultivated and not protected.

Capability unit IIIe-3.—Deep, well-drained, sloping soils formed in silts and clays of marine origin.

Capability unit IIIe-4.—Deep, well-drained, sloping soils that have 2 to 2½ feet of loamy fine sand and fine sand over silt and clay marine deposits.

Capability unit IIIe-5.—Deep, well-drained, sloping loamy soils formed in thick glacial till on uplands.

Capability unit IIIe-6.—Deep, well-drained, sloping loamy soils formed in compact glacial till on rounded hills of the uplands.

Capability unit IIIe-55.—Deep, somewhat excessively drained, sloping soils formed in sandy glacial till on uplands.

Capability unit IIIe-56.—Shallow, somewhat excessively drained, gently sloping soils intermingled with pockets of deeper well-drained soils on the uplands. The shallow soils predominate, and they formed in a thin mantle of glacial till underlain by bedrock at a depth of about 20 inches.

Subclass IIIw. Soils that have severe limitations because of excess water.

Capability unit IIIw-13.—Deep, somewhat poorly drained and poorly drained, nearly level soils on flood plains. These soils are subject to frequent flooding.

Capability unit IIIw-22.—Deep, moderately well drained, nearly level to gently sloping, sandy soils on terraces and sand plains.

Capability unit IIIw-43.—Deep, somewhat poorly drained and poorly drained, nearly level to gently sloping soils consisting of about 2 feet of fine sandy loam over silt and clay marine deposits.

Capability unit IIIw-53.—Deep, somewhat poorly drained and poorly drained, nearly level to gently sloping soils formed in loamy glacial till in upland depressions.

Capability unit IIIw-63.—Deep, somewhat poorly drained and poorly drained, nearly level to gently sloping loamy soils formed in compact glacial till in upland depressions.

Subclass IIIs. Soils that have severe limitations because of available water capacity.

Capability unit IIIs-16.—Deep, excessively drained, nearly level soils on flood plains. They are subject to frequent flooding.

Capability unit IIIs-26.—Deep, excessively drained, nearly level to gently sloping sandy soils on plains and terraces.

Class IV. Soils that have very severe limitations that restrict the choice of plants, require very careful management, or both.

Subclass IVe. Soils that are subject to very severe erosion if they are cultivated and not protected.

Capability unit IVe-3.—Deep, well-drained, moderately steep to steep soils formed in thick deposits of silt and clay, mostly of marine origin.

Capability unit IVe-5.—Deep, well-drained, moderately steep soils formed in loamy glacial till on uplands.

Capability unit IVe-6.—Deep, well-drained, moderately steep loamy soils formed in compact glacial till on rounded hills of the uplands.

Capability unit IVe 56. Shallow, somewhat excessively drained, sloping soils intermingled with pockets of deeper well-drained soils on the uplands. The shallow soils predominate. They formed in a thin mantle of glacial till underlain by bedrock at a depth of about 20 inches.

Subclass IVw. Soils that have very severe limitations because of excess water.

Capability unit IVw-33.—Deep, poorly drained, nearly level to gently sloping soils formed in thick silt and clay marine deposits.

Subclass IVs. Soils that have very severe limitations because of low available water capacity.

Capability unit IVs-26.—Deep, excessively drained, sloping sandy soils on plains and terraces.

Class V. Soils that are not likely to erode but that have other limitations that are impractical to remove without major reclamation. The limitations restrict use largely to pasture, woodland, or wildlife habitat.

Subclass Vw. Soils too wet for cultivation; drainage not feasible.

Capability unit Vw-23.—Deep, somewhat poorly drained and poorly drained sandy soils in flat depressional areas on outwash plains.

Class VI. Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture, woodland, or wildlife habitat.

Subclass VIe. Soils that are severely limited, chiefly by risk of erosion, if protective cover is not maintained.

Capability unit VIe-56.—Shallow, somewhat excessively drained, moderately steep soils intermingled with pockets of deeper, well-drained soils on the uplands. The shallow soils predominate. They formed in a thin mantle of glacial till underlain by bedrock at a depth of about 20 inches.

Subclass VIw. Soils that are severely limited by wetness and are unsuitable for cultivation.

Capability unit VIw-34.—Deep, very poorly drained, nearly level soils formed in silt and clay marine deposits.

Subclass VIs. Soils that are generally unsuitable for cultivation and are limited for other uses by stones and outcrops of bedrock.

Capability unit VIs-7.—Deep, well-drained and somewhat excessively drained, gently sloping to moderately steep, very stony soils formed in glacial till on uplands.

Capability unit VIs-57.—Shallow, very rocky, gently sloping to moderately steep soils intermingled with pockets of deeper, well-drained soils on the uplands. The shallow soils predominate. They formed in a thin mantle of glacial till underlain by bedrock at a depth of about 20 inches.

Capability unit VIs-72.—Deep, moderately well drained, nearly level to sloping, very stony soils formed in glacial till on uplands.

Class VII. Soils that have very severe limitations that make them unsuitable for cultivation without major reclamation and that restrict their use largely to grazing, woodland, or wildlife.

Subclass VIIw. Soils that are very severely limited by excess water.

Capability unit VIIw-14.—Deep, moderately well drained to very poorly drained, nearly level soils on flood plains. They are frequently flooded.

Subclass VIIs. Soils that are very severely limited by low available water capacity, stones, or outcrops of bedrock.

Capability unit VIIs-7.—Deep. well-drained and somewhat excessively drained, steep to very steep, very stony soils formed in glacial till on uplands.

Capability unit VIIs-26.—Deep, excessively drained, moderately steep to very steep sandy soils that occupy terrace breaks.

Capability unit VIIs-27.—Deep, excessively drained, moderately steep to very steep, gravelly soils on terrace breaks, kames, and eskers.

Capability unit VIIs-58.—Deep and shallow, well-drained and somewhat excessively drained, sloping to very steep, extremely stony and extremely rocky soils on uplands.

Capability unit VIIs-73.—Deep, somewhat poorly drained and poorly drained, nearly level to gently sloping, very stony soils formed in glacial till on uplands.

Capability unit VIIs-74.—Deep, very poorly drained, nearly level loamy soils formed in compact glacial till in upland depressions.

Class VIII. Soils and landforms that, without major reclamation, have limitations that preclude their use for commercial production of plants and restrict their use to recreation, wildlife, water supply, or to esthetic purposes.

Subclass VIIIw. Extremely wet or marshy land.

Capability unit VIIIw-89.—Fresh water marsh and Tidal marsh.

Subclass VIIIs. Rock or soil materials that have little potential for production of vegetation.

Capability unit VIIIs-90.—Rock outcrop.

Estimated yields

The estimated yields of the principal crops grown in Strafford County are shown in table 2. Yields are estimated for two levels of management and are listed under columns A and B. Those in columns A are estimated for the prevailing or ordinary management now being used by farmers in the county. Yields in columns B are those expected under improved management practices. Soils not shown in the table are considered too steep, too stony, too rocky, or too wet to produce economical yields of the crops listed. In addition, miscellaneous land types are not shown because their use is limited to nonfarm purposes, or their properties are too variable for reliable estimates, to be made.

The yields shown are averages that can be expected over a period of several years. In any one year, yields may be affected by several factors, such as favorable or unfavorable weather, plant diseases, or insects.

The estimates in columns A and columns B are based largely on (1) observations made by soil scientists during the survey and by members of the New Hampshire Agricultural Experiment Station; (2) records of farmers; and (3) records of other agricultural workers involved in obtaining yields throughout the county. For most soils, however, records on specific crop yields were not available.

Under prevailing or ordinary management, insufficient amounts of lime, fertilizer, and manure are used, and on some farms, erosion control, drainage, and irrigation are inadequate. Improved plant varieties, certified seed, and proper seedbed preparation are not always used, and insects, plant diseases, and weeds are not well controlled.

Improved management needed to obtain the yields listed in columns B includes (1) liming to the pH required for the crop; (2) fertilizing according to need or desired yields as determined by soil tests; (3) using good

TABLE 2.—*Estimated average acre yields of the principal crops under two levels of management*

[Yields in columns A are those obtained under ordinary management; those in columns B can be expected under improved management. Absence of figure indicates the crop is not commonly grown or is not well suited to the soil, or yields do not justify the level of management specified. Very steep, stony or rocky soils, extremely wet soils, and miscellaneous land types have been omitted from the table. When yields are rated below the minimums of 12 tons for corn silage, 300 bushels for potatoes, and 2 tons for hay, no yield estimates are given under the B level of management]

Soil	Corn for silage [1]		Potatoes		Hay: Alfalfa-grass [2]		Hay: Clover-grass [3]		Pasture: Permanent bluegrass		Pasture: Tall grass-legume	
	A	B	A	B	A	B	A	B	A	B	A	B
	Tons	*Tons*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [4]	*Cow-acre-days* [4]	*Cow-acre-days* [4]	*Cow-acre-days* [4]
Acton fine sandy loam, 0 to 8 percent slopes	-----	18	-----	-----	2.0	4.0	2.0	4.0	90	145	115	230
Buxton silt loam, 0 to 3 percent slopes	13	20	-----	-----	1.5	3.0	2.0	3.5	95	150	115	200
Buxton silt loam, 3 to 8 percent slopes	14	21	-----	-----	1.5	3.5	2.0	3.5	95	150	115	200
Charlton fine sandy loam, 3 to 8 percent slopes	14	22	350	550	2.5	4.5	2.0	4.0	85	150	115	255
Charlton fine sandy loam, 8 to 15 percent slopes	12	20	300	475	2.5	4.5	2.0	4.0	85	150	115	255
Charlton fine sandy loam, 15 to 25 percent slopes	-----	16	-----	-----	2.0	4.0	1.5	3.5	80	145	85	230
Deerfield loamy sand, 0 to 3 percent slopes	-	16	-----	-----	1.5	3.5	1.5	3.0	80	145	85	200
Deerfield loamy sand, 3 to 8 percent slopes	-----	16	-----	-----	2.0	3.5	1.5	3.0	80	145	85	200
Elmwood fine sandy loam, 0 to 3 percent slopes	-----	20	-----	-----	2.0	3.5	2.5	4.0	95	150	115	230
Elmwood fine sandy loam, 3 to 8 percent slopes	---	20	-----	-----	2.0	4.0	2.5	4.0	95	150	115	230
Gloucester fine sandy loam, 3 to 8 percent slopes	-----	16	325	425	2.5	4.0	1.5	3.0	75	115	85	230
Gloucester fine sandy loam, 8 to 15 percent slopes	-----	14	-----	375	2.5	4.0	1.5	3.0	75	115	85	230
Hinckley loamy sand, 0 to 3 percent slopes	---	12	-----	-----	1.5	2.5	1.0	2.0	------	------	55	145
Hinckley loamy sand, 3 to 8 percent slopes	-----	12	-----	-----	1.5	2.5	1.0	2.0	------	------	55	145
Hollis-Charlton fine sandy loams, 3 to 8 percent slopes	-----	15	-----	-----	2.0	3.5	1.5	3.0	75	145	85	200
Hollis-Charlton fine sandy loams, 8 to 15 percent slopes	-----	14	-----	-----	2.0	3.5	1.5	3.0	75	145	85	200
Hollis-Charlton fine sandy loams, 15 to 25 percent slopes	-----	-----	-----	-----	1.5	3.0	1.5	2.5	50	115	85	170
Hollis-Gloucester fine sandy loams, 3 to 8 percent slopes	-----	15	-----	-----	2.0	3.5	1.5	3.0	75	145	85	200
Hollis-Gloucester fine sandy loams, 8 to 15 percent slopes	-----	14	-----	-----	2.0	3.5	1.5	3.0	75	145	85	200
Leicester fine sandy loam, 0 to 8 percent slopes	-----	15	-----	-----	-----	-----	1.0	3.5	55	115	85	200
Ondawa fine sandy loam	18	25	350	600	2.5	4.5	2.0	4.0	75	145	125	255
Paxton fine sandy loam, 0 to 8 percent slopes	14	22	350	600	2.5	4.5	2.0	4.0	95	150	115	255
Paxton fine sandy loam, 8 to 15 percent slopes	14	20	350	550	2.5	4.5	2.0	4.0	95	150	115	255
Paxton fine sandy loam, 15 to 25 percent slopes	-----	18	-----	-----	2.0	4.0	2.0	3.5	95	150	115	230
Podunk fine sandy loam	14	22	--	---	2.0	4.0	2.5	4.5	75	115	115	255
Ridgebury fine sandy loam, 0 to 3 percent slopes	-----	15	-----	-----	-----	-----	1.5	3.5	75	145	85	200
Ridgebury fine sandy loam, 3 to 8 percent slopes	-----	15	-----	-----	-----	-----	1.5	3.5	75	145	85	200
Rumney fine sandy loam	-----	18	---	-----	-----	-----	1.0	3.5	55	115	55	200
Scantic silt loam, 0 to 3 percent slopes	-----	16	-----	-----	-----	-----	1.5	3.0	70	145	85	170
Scantic silt loam, 3 to 8 percent slopes	-----	18	-----	-----	-----	-----	1.5	3.5	70	145	85	200
Suffield silt loam, 8 to 15 percent slopes	15	22	350	450	2.0	4.0	2.0	3.5	80	150	115	230
Suffield silt loam, 15 to 35 percent slopes	14	20	-----	-----	2.0	3.5	1.5	3.0	80	150	85	200
Suncook loamy sand	-----	12	-----	-----	1.0	2.5	1.0	2.0	35	100	55	145
Sutton fine sandy loam, 0 to 8 percent slopes	12	20	-----	450	2.0	4.0	2.0	4.0	80	150	115	230
Swanton fine sandy loam, 0 to 3 percent slopes	-----	16	-----	-----	-----	-----	1.0	3.0	45	100	55	170
Swanton fine sandy loam, 3 to 8 percent slopes	-----	18	-----	-----	-----	-----	1.0	3.0	45	100	55	170
Windsor loamy sand, 0 to 3 percent slopes	-----	12	-----	-----	1.0	2.5	1.0	2.0	35	115	55	145
Windsor loamy sand, 3 to 8 percent slopes	-----	12	-----	-----	1.0	2.5	1.0	2.0	35	115	55	145
Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes	12	22	350	500	2.0	4.0	2.0	3.5	75	150	115	230
Windsor loamy fine sand, clay subsoil variant, 8 to 15 percent slopes	12	20	300	450	2.0	4.0	2.0	3.5	75	150	115	230
Woodbridge fine sandy loam, 0 to 8 percent slopes	12	22	-----	400	2.0	4.0	2.0	4.0	90	150	115	230

[1] Estimates are for green weight.

[2] Based on alfalfa-timothy mixture, the one most commonly used.

[3] Based on red clover-timothy mixture, the one most commonly used.

[4] Cow-acre-days is a term used to express the number of days one acre will support one animal unit (one cow, steer, or horse; five hogs; or seven sheep or goats) without injury to pasture.

cropping systems; (4) controlling runoff, erosion, weeds, brush, insects, and plant diseases; (5) preparing seedbeds adequately; (6) selecting suitable crops and varieties; and (7) adjusting plant populations and seeding rates to the kind of soil and to the yields that may be expected. (In estimating silage corn yields, plant populations of 20,000 to 24,000 per acre were assumed.) Improved management for pasture includes liming, fertilizing, brush and weed control, seeding desirable forage plants, and regulating grazing.

Soils in Woodland Management

This subsection gives a brief history of the woodlands in Strafford County and discusses the suitability of the soils for production of certain types of trees.

Woodland history [3]

When the first settlers arrived at Dover Point, 90 to 95 percent of the survey area was in forest. The remaining 5 to 10 percent was made up mostly of areas that had been cleared by Indians for farming and campsites.

Although records on early land use are scarce, it appears that the settlers soon found a market for their forest products. In old deeds there are many references to sawmills, tanneries, and kilns. The first sawmill, built before 1643, was across the Salmon Falls River in Maine. It was owned and operated by residents of Dover, who probably supplied the mill with large quantities of logs havested in Strafford County. Boat shops were common along the Cocheco, Salmon Falls, Piscataqua, and Oyster Rivers. The boat shops used white pine and white oak timber. Tanneries used hemlock bark, and white pine was exported for ship masts. Many early brickyards around Dover consumed large quantities of hardwoods. Potash production was also an early use of wood.

By 1825 most of the original timber stands had been logged off, and towns having soils with good farming potential, such as Madbury and Rollinsford, were 90 percent open land. Barrington and other towns having stony soils were about 60 percent open fields and pasture. Sawtimber, and even wood for fuel, were scarce in most of the towns.

Between 1825 and 1860, land use was generally static. Although textile and shoe factories were being built in the larger towns, a large population of farmers was still in the county and farming was the leading industry. From 1860 to the present, the number of farmers and the acreage of nonforested land have declined steadily. Today forests cover approximately 83 percent of the land area, or 200,700 acres.

Little information is available pertaining to the original types of forests in Strafford County. Early names of streams, swamps, and roads, and the boundary trees mentioned in old deeds give some indications of the species of trees growing when the area was first settled.

The coastal area appears to have been mostly in white pine and white oak. There was occasional reference to cedar, maple, and white ash in the wet areas. The sandy area, which includes the present city of Rochester, was called Norway Plains. There were few references to beech, sugar maple, and red oak in the coastal area, but apparently these trees were in the upland areas of the county. In the upland areas were also white pine and hemlock trees. Trees for quality ship masts were in the northern tier of towns. There were also parts of the county where the American chestnut predominated; for example, the Chestnut Hill area of Farmington and Rochester.

The present condition of forests in Strafford County is the result of the many changes in rural land use over the past 300 years. Since trees require as much as 100 years to reach commercial size, it is desirable to know how they have developed.

From 1860 to 1920, rapid abandonment of open farmland favored the regeneration of white pine, grey birch, red maple, black cherry, oaks, and other hardwood species. The big local demand for fuel wood for heating rural and urban homes brought about the removal of the hardwood species from the pine stands.

By 1918 the woodlands in Strafford County supported many pure stands of white pine that was low in quality but high in volume per acre. An ideal situation for the clear-cut harvesting of the white pine stands resulted from the development of the portable mill and from wartime demands for low-quality white pine for the boxboard market. Unfortunately, these clear-cut areas did not regenerate to pure pine stands. They became a complex mixture of weed trees, such as gray birch, red maple, and pin cherry, and good timber, such as white pine, hemlock, red oak, and sugar maple. It was not economical to remove the weed trees from these stands, because cheap forestry labor was not available and coal and oil were the new heating fuels. In many cases the weed trees took over. The composition in the stands was further affected by removal of white pine, hemlock, or red oak trees from many stands as soon as they reached saw-log size.

By 1946 some landowners and land managers had become alarmed by the condition of their woodlands, which were generally covered with nonmerchantable trees that were small and of inferior quality. As a result, a county forestry program was initiated. A part-time county forester was employed by the Cooperative Extension Service to carry on an educational program, which included assistance in the field. Forestry programs were sponsored by the Agricultural Stabilization and Conservation Service, the Strafford County Conservation District, and the new Tree Farm Committee. The main objective of all the programs was to improve composition and quality of tree stands through better management of forest land.

A research forester has estimated that by 1965 about 50 percent of all woodlands in the county were under some degree of forest management. The greatest improvements in management have been in immature forest stands, where weeding, thinning, and pruning operations have improved the composition of the forests.

The majority of the forest land in Strafford County is in small private holdings. Generally, the owners are nonfarmers who are not dependent upon the woodlands for income. They are generally more interested in multiple land use than in timber production alone. Selective cutting to improve the condition of the forests has become a recognized method of harvesting timber.

[3] By ROGER LEIGHTON, county forester, Strafford County Cooperative Extension Service.

Landowners are rapidly becoming aware of the importance of growing marketable forest trees that are adapted to the soils and climatic conditions of specific areas. Correct planning of land use and good woodland management will help the woodlands to play a key role in the future economic growth of Strafford County.

Woodland interpretations

Woodland interpretations are made to help landowners plan the management of their soils for woodland. In table 3 each soil in the county is rated according to its estimated tree-producing potential. The hazards and limitations that affect the suitability of soils for woodland are also indicated.

Soils differ in their ability to produce trees just as they do in their ability to produce farm crops. Soil properties affect tree growth, species adaptation, and forest management practices. The depth of the soil, texture, structure, moisture content, and availability of nutrients are factors that are important to tree growth. For example, trees grow faster in deep soils that are high in available moisture capacity, such as those of the Woodbridge series, than they do in gravelly and droughty soils, such as those of the Hinckley series. Other factors that affect tree growth are climate and topography.

Relating the growth of forest trees to the characteristics of soils gives an indication of potential productivity. A standard measure of productivity is *site index.* Site index is the average height of the dominant and codominant trees in a fully stocked stand at the age of 50 years. In table 3 an estimated productivity rating of *excellent*, *good*, *fair*, *or poor* is assigned for each mapping unit to show suitability for white pine, upland oaks, and northern hardwoods (fig. 15). These ratings are based on site index measurements. Only a few of these measurements have been made in Strafford County. The ratings shown in table 3 are based mostly on site index measurements made on the same or similar soils in nearby counties.

Seedling mortality is the failure of seedlings to grow after adequate natural seeding or after suitable seedlings are planted. Mortality is *slight* if trees ordinarily regenerate naturally in places where there are sufficient seeds, or if loss is not more than 25 percent of the planted stock. A rating of *moderate* indicates that losses are between 25 and 50 percent of the planted stock, or that trees do not degenerate naturally in numbers adequate for restocking. Mortality is *severe* if more than half of the planted stock is likely to die.

***Figure 15.*—A well-managed stand of white pine on Woodbridge soils. Estimated productivity rating is excellent.**

Plant competition refers to the degree of competition from other plants and the rate that undesirable species invade different soils when openings are made in the canopy. Competition is *slight* if unwanted plants are no special problem. It is *moderate* if the invaders delay but do not prevent the establishment of normal, fully stocked stands of desirable trees. Competition is *severe* if desirable trees cannot regenerate naturally or artificially without intensive site preparation and maintenance such as weeding. Plant competition in table 3 is subdivided into competition for hardwoods and for conifers.

Equipment limitations are rated according to the degree to which soil characteristics restrict or prohibit the use of equipment commonly used in woodland management or in tree harvesting. Natural wetness, steepness of slope, and number of stones and boulders are the principal limiting factors considered. Limitations are *slight* if slopes are less than 15 percent in gradient and there are no special problems in the use of equipment throughout the year. A rating of *moderate* indicates that the use of heavy equipment is restricted by wetness in spring and wet seasons, or that slopes range from 15 to 35 percent. A rating of *severe* indicates that use of some kinds of equipment is limited because the soils are very poorly drained, or are extremely stony or rocky, because of steep slopes (greater than 35 percent), or because the soils are too wet for more than 3 months during the year.

Limitations on woodland roads are based on soil characteristics that restrict or prohibit construction or use of access roads. Natural drainage, rockiness, the number of stones and boulders, erosion hazard, and gradient are examples of these factors. A rating of *slight* indicates that no special problems are recognized. A rating of *moderate* indicates that the soil is limited for the construction or use of roads for less than 3 months per year; seasonal wetness is a common problem. A *severe* rating indicates that normal use is restricted for more than 3 months per year because of wetness, or that the number of boulders or rock outcrops limits road construction.

Windthrow hazard depends on the development of roots and on the ability of soils to hold trees firmly. A rating of *slight* indicates that roots of trees develop normally and windthrow is not common. A rating of *moderate* indicates that trees will remain standing unless wind velocity is high and the soils are unusually wet. A rating of *severe* indicates that the soil does not allow adequate rooting for stability. Windthrow may be common because of a high water table, a pan layer, or because bedrock limits the depth of roots to about 10 inches.

Also in table 3, the species to be favored in natural stands and generally preferred for planting are given. The species named are best for the soils listed, and they are listed in order of priority. They are also considered to have a higher relative value than those not named. Hardwoods are not listed for new plantings, because they are more difficult to establish and normally are less successful than conifers.

TABLE 3.—*Estimated productivity, limitations*

[Gravel and borrow pits (Gv), Made land (Ma), and Mixed alluvial land, wet (Ml) are too variable to be rated. Biddeford (Be), Fresh asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that appear in the first column of this table]

Soil series and map symbols	Estimated productivity ratings for—			Factors affecting management		
	White pine	Upland oaks	Northern hardwoods	Seedling mortality	Plant competition: Hardwoods	Plant competition: Conifers
Acton: AcB, AdB, AcC	Good	Good	Good	Slight	Slight	Moderate
Buxton: BzA, BzB	Good	Good	Good	Moderate	Slight	Moderate
Charlton:						
CfB, CfC, CsB, CsC	Good	Good	Good	Slight	Slight	Moderate
CfD, CsD	Good	Good	Good	Slight	Slight	Moderate
CvD	Good	Good	Good	Slight	Slight	Moderate
Deerfield: DeA, DeB	Good	Good	Good	Slight	Slight	Moderate
Elmwood: EaA, EaB	Excellent	Good	Good	Slight	Slight	Moderate
Gloucester:						
GlB, GlC, GsB, GsC	Good	Good	Good	Moderate	Slight	Slight
GsD	Good	Good	Good	Moderate	Slight	Slight
GsE	Good	Good	Good	Moderate	Slight	Slight
GtD	Good	Good	Good	Moderate	Slight	Slight
GtE	Good	Good	Good	Moderate	Slight	Slight
Hinckley:						
HaA, HaB, HaC	Fair	Fair	Fair	Severe	Slight	Slight
HbE	Fair	Fair	Fair	Severe	Slight	Slight
*Hollis:						
HcB, HcC, HfB, HfC	Fair	Fair	Good	Severe	Slight	Slight
HcD, HdB, HdC, HdD, HgB, HgC, HgD.	Fair	Fair	Good	Severe	Slight	Slight
HeD, HeE, HlD, HlE	Fair	Fair	Good	Severe	Slight	Slight
For Charlton and Gloucester parts, see Charlton and Gloucester series.						
*Leicester: LcB, LeA, LeB, LrA, LrB.	Good	Good	Fair	Severe	Moderate	Moderate
For Ridgebury part of LrA and LrB, see Ridgebury series.						
Ondawa: On	Good	Good	Good	Slight	Slight	Moderate
Paxton:						
PbB, PbC, PdB, PdC	Good	Excellent	Excellent	Slight	Slight	Moderate
PbD, PdD	Good	Excellent	Excellent	Slight	Slight	Moderate
PdE	Good	Excellent	Excellent	Slight	Slight	Moderate
Podunk: Po	Excellent	Excellent	Excellent	Slight	Slight	Moderate
Ridgebury: RgA, RgB, RlA, RlB	Good	Good	Fair	Severe	Moderate	Moderate
Rumney: Ru	Good	Fair	Fair	Severe	Moderate	Moderate
Saugatuck: Sb	Good	Fair	Fair	Severe	Moderate	Moderate

and suitability of the soils for woodland

water marsh (Fa), Muck and peat (Mp), Rock outcrop (Ro), and Tidal marsh (Ta) are unsuited to commercial production of timber. An in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions

Factors affecting management—Continued			Species preference in order of priority for—	
Equipment limitations	Limitations on woodland roads	Windthrow hazard	Planting	Natural stands
Slight	Moderate	Slight	White pine, white spruce, and red pine.	White pine, white ash, red oak, and sugar maple.
Slight	Moderate	Slight	White pine and white spruce	White pine, red oak, sugar maple, and white ash.
Slight	Slight	Slight	White pine, red pine, and white spruce.	White pine, red oak, hemlock, sugar maple, and paper birch.
Moderate	Slight	Slight	White pine, red pine, and white spruce.	White pine, red oak, hemlock, sugar maple, and paper birch.
Moderate	Severe	Slight	White pine, red pine, and white spruce.	White pine, red oak, hemlock, sugar maple, and paper birch.
Slight	Moderate	Slight	White pine, white spruce, and red pine	White pine, red oak, sugar maple, and red maple.
Slight	Moderate	Slight	White pine and white spruce	White pine, sugar maple, and red maple.
Slight	Slight	Slight	White pine, red pine, and white spruce.	White pine, red oak, hemlock, paper birch, and sugar maple.
Moderate	Slight	Slight	White pine, red pine, and white spruce.	White pine, red oak, hemlock, paper birch, and sugar maple.
Severe	Moderate	Slight	White pine, red pine, and white spruce.	White pine, red oak, hemlock, paper birch, and sugar maple.
Moderate	Severe	Slight	White pine, red pine, and white spruce.	White pine, red oak, hemlock, paper birch, and sugar maple.
Severe	Severe	Slight	White pine, red pine, and white spruce.	White pine, red oak, hemlock, paper birch, and sugar maple.
Slight	Slight	Slight	Red pine and white pine	White pine and red pine.
Severe	Slight	Slight	Red pine and white pine	White pine and red pine.
Slight	Slight	Moderate	White pine, red pine, and white spruce.	White pine, red oak, black birch, sugar maple, and hemlock.
Moderate	Moderate	Moderate	White pine, red pine, and white spruce.	White pine, red oak, black birch, sugar maple, and hemlock.
Severe	Severe	Moderate	White pine, red pine, and white spruce.	White pine, red oak, black birch, sugar maple, and hemlock.
Severe	Severe	Severe	White spruce and white pine	White pine, white ash, and red maple.
Slight	Slight	Slight	White pine, red pine, and white spruce.	White pine, red maple, and white ash.
Slight	Slight	Slight	White pine, white spruce, and red pine.	White pine, red oak, hemlock, sugar maple, paper birch, and white ash.
Moderate	Slight	Slight	White pine, white spruce, and red pine.	White pine, red oak, hemlock, sugar maple, paper birch, and white ash.
Severe	Moderate	Slight	White pine, white spruce, and red pine.	White pine, red oak, hemlock, sugar maple, paper birch, and white ash.
Slight	Moderate	Slight	White pine, white spruce, and red pine.	White pine, red maple, and white ash.
Severe	Severe	Severe	White spruce and white pine	White pine, white ash, and red maple.
Severe	Severe	Severe	White spruce and white pine	Red maple.
Severe	Severe	Severe	White pine and white spruce	Red maple, white ash.

TABLE 3.—*Estimated productivity, limitations,*

Soil series and map symbols	Estimated productivity ratings for—			Factors affecting management		
	White pine	Upland oaks	Northern hardwoods	Seedling mortality	Plant competition	
					Hardwoods	Conifers
Scantic: ScA, ScB	Fair	Poor	Fair	Severe	Severe	Severe
Suffield: SfC, SfE	Good	Good	Good	Slight	Slight	Moderate
Suncook: Sk	Fair	Fair	Fair	Severe	Slight	Slight
Sutton: SnB, SuB	Good	Good	Good	Slight	Slight	Moderate
Swanton: SwA, SwB	Fair	Poor	Fair	Severe	Moderate	Moderate
Whitman: Wa	Fair	Poor	Poor	Severe	Moderate	Moderate
Windsor:						
WdA, WdB, WdC	Fair	Fair	Good	Severe	Slight	Slight
WdE	Fair	Fair	Good	Severe	Slight	Slight
Windsor, clay subsoil variant: WfB, WfC.	Good	Good	Fair	Moderate	Slight	Slight
Woodbridge: WgB, WsB, WsC	Excellent	Excellent	Excellent	Slight	Slight	Moderate

With the productivity ratings shown in table 3 and the yield data listed below, average yield per acre can be estimated for unmanaged stands of white pine, upland oaks, and northern hardwoods in each mapping unit.

The yields of white pine and northern hardwoods are from trees 12 inches in diameter at breast height and up to an 8-inch top. For upland oaks, yields are to a top diameter of 5 inches inside bark (International rule, ⅛-inch kerf).

Forest species and productivity ratings	*Site index range (feet)*	*Average yield per acre (board feet)*
White pine:		
Excellent	70 or more	50,000
Good	60 to 69	36,500
Fair	50 to 59	24,000
Poor	49 or less	14,000
Upland oaks:		
Excellent	65 or more	9,750
Good	55 to 64	6,300
Fair	45 to 54	3,250
Poor	44 or less	1,400
Northern hardwoods:		
Excellent	59 or more	3,000
Good	53 to 58	2,300
Fair	45 to 52	900
Poor	44 or less	

The yield data listed above are from the following sources: White pine—USDA Bulletin 13 (*7*); upland oaks—yield, stand, and volume tables for even-aged upland oak forests, USDA Technical Bulletin 560 (*13*); northern hardwoods—Proceedings of the First Northern American Forest Soils Conference, 1958 (*5*), and from site index data from U.S. Forest Service Lake States Forest Experimental Station Technical Note 485 (*24*).

Soils in Wildlife Management [4]

Strafford County has a good population of fish and wildlife. Deer, snowshoe hare, grouse, beaver, muskrat, and fisher are common. Waterfowl are abundant, especially during migration. Geese and ducks winter in the tidal rivers and in Great Bay. Warm-water fish predominate, but salmonoid species can be found in most ponds, lakes and streams. Alewives, striped bass, smelts, and eels are taken in the tidal rivers.

Successful management of wildlife on any tract of land requires that a suitable combination of food, cover, and water be available. If any one of these elements is lacking or unfavorably distributed, certain desirable wildlife species may be absent or limited in number. Information on soils provides a valuable tool in creating, improving, or maintaining suitable food, cover, and water for wildlife.

Most wildlife habitat is managed by planting suitable vegetation, by manipulating existing vegetation to increase or improve desired plants or to bring about their natural establishment, or by combinations of such measures. In addition, water areas can be created or natural areas can be improved as wildlife habitat. Information on soils is useful for these purposes.

Soil interpretations for wildlife habitat serve a variety of purposes. They are guides for selecting the more suitable sites for various kinds of habitat management. They indicate the level of management needed to achieve satisfactory results. They also show why it is not generally feasible to manage a particular area for a given kind of wildlife. These interpretations also may serve in broad-scale planning of wildlife management areas, parks, and nature areas, or for acquiring wildlife lands. The suitability or grouping of individual habitat elements may be considered by using a map overlay.

The soil areas shown on the soil survey maps are rated without regard to their position relative to adjoining delineated areas. The size, shape, or location of the outlined area does not affect the rating. Certain influences on habitats, such as elevation and aspect, must be appraised onsite. For specific information on a given limitation, the section "Descriptions of Soils" should be consulted.

[4] This subsection was prepared by DAVID N. ALLAN, field biologist, Soil Conservation Service.

and suitability of the soils for woodland—Continued

Factors affecting management—Continued			Species preference in order of priority for—	
Equipment limitations	Limitations on woodland roads	Windthrow hazard	Planting	Natural stands
Severe	Severe	Severe	White spruce and white pine	White pine, white ash, and red maple.
Moderate	Moderate	Slight	White pine, white spruce, and red pine	White pine, red oak, sugar maple, and paper birch.
Slight	Slight	Slight	Red pine and white pine	White pine and red pine.
Slight	Moderate	Slight	White pine, white spruce, and red pine	White pine, white ash, red oak, and sugar maple.
Severe	Severe	Severe	White spruce and white pine	White pine and red maple.
Severe	Severe	Severe	White spruce and white pine	Red maple.
Slight	Slight	Slight	Red pine and white pine	White pine and red pine.
Severe	Slight	Slight	Red pine and white pine	White pine and red pine.
Slight	Slight	Slight	White pine and red pine	White pine and red pine.
Slight	Moderate	Slight	White pine and white spruce	White pine, red oak, sugar maple, yellow birch, white ash, and paper birch.

In table 4 the soils of Strafford County are rated for their suitability for the creation, improvement, or maintenance of eight wildlife habitat elements (*1*). The ratings good, fair, poor, and unsuited indicate the degree of suitability of soils for a given habitat element. A rating of *good* indicates that soil limitations do not significantly affect management of the designated habitat element. Generally, the intensity of management required for the creation, improvement, or maintenance of the habitat element is low and satisfactory results are reasonably assured. A rating of *fair* indicates that soil limitations moderately affect the management of the designated habitat element. Moderately intensive effort is required to achieve satisfactory results. A rating of *poor* indicates that soil limitations are severe. Successful creation, improvement, or maintenance of the designated habitat element is generally expensive and requires intensive effort. A rating of *unsuited* indicates that soil limitations are so extreme that management efforts are not practical.

The eight wildlife habitat elements rated in table 4 are as follows:

Grain and seed crops.—Agricultural grains or seed-producing annuals planted to produce food for wildlife. Examples are corn, rye, wheat, oat, millet, buckwheat, and sunflowers.

Grasses and legumes.—Domestic perennial grasses and herbaceous legumes that are established by planting and that furnish wildlife food and cover. Examples are fescue, bromegrass, bluegrass, timothy, redtop, orchardgrass, reed canarygrass, clover, trefoil, alfalfa, crownvetch, and panicgrass (switchgrass).

Wild herbaceous upland plants.—Native or introduced perennial grasses and forbs (weeds) that provide food and cover principally to upland forms of wildlife, and that are established mainly through natural processes. Examples are bluestems, indiangrass, wheatgrass, quackgrass, wild ryegrass, oatgrass, bunch berry, pokeweed, strawberries, lespedeza, beggarweed, wild beans, nightshade, goldenrod, and dandelions.

Hardwood woody plants.—Nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, twigs (browse), or foliage used extensively as food by wildlife. Commonly they are established through natural processes, but they may also be planted. Examples are oak, beech, cherry, hawthorn, dogwood, viburnum, maple, birch, poplar, grape, honeysuckle, blueberry, brier, autumn-olive, and multiflora rose.

Coniferous wildlife habitat.—Cone-bearing trees and shrubs important to wildlife mainly as cover but also as a food source in the form of browse, seeds, or fruitlike cones. Plants commonly are established through natural processes, but they may also be planted. Examples are spruce, pine, white-cedar, hemlock, balsam fir, juniper, and yew.

Wetland food and cover plants.—Annual and perennial wild herbaceous plants in moist to wet sites, exclusive of submerged or floating aquatics, that produce food or cover primarily for wetland forms of wildlife. Examples are smartweed, wild millet, bulrush, spike sedge, rush, sedge, burreed, wildrice, rice cutgrass, mannagrass, and cattail.

Shallow water developments.—Impounded or excavated areas where water generally does not exceed 6 feet in depth. Examples are low dikes and levees, shallow dugouts, level ditches, and devices for control of water level in marshy drainageways or channels (fig. 16).

Excavated ponds.—Dugout areas or combinations of dugout areas and dammed areas that contain water of suitable quality and depth for production of fish or wildlife. Examples are ponds that are built in nearly level areas that are at least one-fourth acre in size and have an average depth of 8 feet in at least 25 percent of the area. A dependable high water table or other source of water in the area is also required.

The suitability ratings in table 4 apply to the following three major kinds of wildlife.

Open-land wildlife.—Birds and mammals that normally frequent croplands, pastures, meadows, lawns, and areas

TABLE 4.—*Suitability of the soils for element*

[Gravel and borrow pits (Gv) and Rock outcrop (Ro) do not provide a suitable habitat and are not rated; Made land (Ma) and Mixed is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this

Soil series and map symbols	Wildlife habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Woodland plants: Hardwoods
Acton:				
AcB	Fair	Good	Good	Fair
AdB, AdC	Unsuited	Poor	Good	Fair
Biddeford: Be	Unsuited	Poor	Poor	Good
Buxton:				
BzA	Fair	Good	Good	Good
BzB	Fair	Good	Good	Good
Charlton:				
CfB, CfC	Fair	Good	Good	Good
CfD	Poor	Fair	Good	Good
CsB, CsC, CsD	Unsuited	Poor	Good	Good
CvD	Unsuited	Unsuited	Good	Good
Deerfield:				
DeA	Fair	Good	Good	Good
DeB	Fair	Good	Good	Good
Elmwood:				
EaA	Fair	Good	Good	Good
EaB	Fair	Good	Good	Good
Fresh water marsh: Fa	Unsuited	Unsuited	Unsuited	Unsuited
Gloucester:				
GlB, GlC	Fair	Good	Good	Fair
GsB, GsC, GsD	Unsuited	Poor	Good	Fair
GsE, GtD, GtE	Unsuited	Unsuited	Good	Fair
Hinckley:				
HaA, HaB, HaC	Poor	Poor	Poor	Poor
HbE	Unsuited	Unsuited	Poor	Poor
*Hollis:				
HcB, HcC, HfB, HfC	Fair	Fair	Fair	Fair
HcD	Poor	Fair	Fair	Fair
HdB, HdC, HdD, HgB HgC, HgD	Unsuited	Poor	Fair	Fair
HeD, HeE, HlD, HlE	Unsuited	Unsuited	Poor	Poor
For Charlton and Gloucester parts, see the Charlton and Gloucester series.				
Leicester:				
LcB	Poor	Fair	Fair	Good
LeA, LrA	Unsuited	Poor	Fair	Good
LeB, LrB	Unsuited	Poor	Fair	Good
Muck and peat: Mp	Unsuited	Unsuited	Unsuited	Unsuited
Ondawa: On	Fair	Good	Good	Good
Paxton:				
PbB, PbC	Fair	Good	Good	Good
PbD	Poor	Fair	Good	Good
PdB, PdC, PdD, PdE	Unsuited	Poor	Good	Good
Podunk: Po	Fair	Good	Good	Good
Ridgebury:				
RgA	Poor	Poor	Fair	Fair
RgB	Poor	Poor	Fair	Fair
RlA	Unsuited	Poor	Fair	Fair
RlB	Unsuited	Poor	Fair	Fair
Rumney: Ru	Unsuited	Poor	Poor	Good
Saugatuck: Sb	Poor	Fair	Fair	Good
Scantic:				
ScA	Poor	Fair	Fair	Good
ScB	Poor	Fair	Fair	Good
Suffield:				
SfC	Fair	Good	Good	Good
SfE	Poor	Fair	Good	Good
Suncook: Sk	Poor	Poor	Poor	Poor
Sutton:				
SnB	Fair	Good	Good	Good
SuB	Unsuited	Poor	Good	Good

of wildlife habitat and kinds of wildlife

alluvial land, wet (Ml) are too variable to be rated. An asterisk in the first column indicates that at least one mapping unit in this series
reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Wildlife habitat elements—Continued				Kinds of wildlife		
Woodland plants—Continued: Coniferous	Wetland food and cover plants	Shallow water developments	Excavated ponds	Open-land	Woodland	Wetland
Fair	Unsuited [1]	Unsuited [1]	Unsuited [1]	Good	Fair	Unsuited.[1]
Fair	Unsuited [1]	Unsuited [1]	Unsuited [1]	Poor	Fair	Unsuited.[1]
Good	Good	Good	Good	Poor	Good	Good.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Unsuited	Good	Good	Good	Unsuited	Unsuited	Good.
Fair	Unsuited	Unsuited	Unsuited	Good	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Good	Unsuited	Unsuited	Unsuited	Poor	Poor	Unsuited.
Good	Unsuited	Unsuited	Unsuited	Unsuited	Poor	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Good	Unsuited	Unsuited	Unsuited	Unsuited	Poor	Unsuited.
Fair	Good	Good [2]	Good [2]	Fair	Good	Good.[2]
Fair	Good	Good	Good	Poor	Fair	Good.
Fair	Poor	Unsuited	Unsuited	Poor	Fair	Unsuited.
Unsuited	Good	Good	Good	Unsuited	Unsuited	Good.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Poor	Fair	Unsuited.
Poor	Poor	Poor	Poor	Good	Good	Poor.
Fair	Good	Good	Good	Poor	Fair	Good.
Fair	Poor	Unsuited	Unsuited	Poor	Fair	Unsuited.
Fair	Good	Good	Good	Poor	Fair	Good.
Fair	Poor	Unsuited	Unsuited	Poor	Fair	Unsuited.
Fair	Good	Fair	Unsuited	Poor	Fair	Fair.
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Poor	Unsuited	Unsuited	Fair	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Fair	Fair	Unsuited.
Fair	Unsuited	Unsuited	Unsuited	Poor	Poor	Unsuited.
Poor	Unsuited [1]	Unsuited [1]	Unsuited [1]	Good	Good	Unsuited.[1]
Poor	Unsuited [1]	Unsuited [1]	Unsuited [1]	Poor	Fair	Unsuited.[1]

TABLE 4.—*Suitability of the soils for elements*

Soil series and map symbols	Wildlife habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Woodland plants: Hardwoods
Swanton:				
SwA	Poor	Fair	Fair	Good
SwB	Poor	Fair	Fair	Good
Tidal marsh: Ta	Unsuited	Unsuited	Unsuited	Unsuited
Whitman: Wa	Unsuited	Poor	Poor	Good
Windsor:				
WdA, WdB, WdC	Poor	Poor	Poor	Poor
WdE	Unsuited	Unsuited	Poor	Poor
Windsor clay subsoil variant: WfB, WfC	Fair	Good	Good	Good
Woodbridge:				
WgB	Fair	Good	Good	Good
WsB, WsC	Unsuited	Poor	Good	Good

[1] Rating is poor where slopes are less than 3 percent.

overgrown with grasses, forbs, and shrubs. Examples are pheasant, mourning doves, meadowlarks, field sparrows, redwing blackbirds, red foxes, and woodchucks. Open land is also used by woodland wildlife such as deer and grouse. Open-land wildlife ratings are based on the suitability of soils for grain and seed crops, grasses and legumes, wild herbaceous upland plants, and hardwoods.

Woodland wildlife.—Birds and mammals that normally frequent wooded areas of coniferous and hardwood trees and shrubs, or mixtures of such plants. Examples are ruffed grouse, woodcock, thrushes, vireos, scarlet tanagers, whitetailed deer, moose, bear, bobcats, porcupine, fisher, raccoons, New England cottontail rabbit, snowshoe hare, gray squirrels, and red squirrels. Woodland wildlife ratings are based on the suitability of soils for hardwood woody plants, conifers, wild herbaceous upland plants, and grasses and legumes.

Wetland wildlife.—Birds and mammals that normally frequent wet areas such as ponds, marshes, and swamps. Examples are black ducks, woodcock, herons, shore birds, beaver, mink, otter, muskrat, turtles, and frogs. Wetland wildlife ratings are based on suitability of soils for wetland food and cover plants, shallow water developments, and excavated ponds.

Soils in Engineering [5]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigations systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 5, 6, and 7, which show, respectively, several estimated soil properties significant to engineering; interpretations for various engineering uses; and results of engineering laboratory tests on soil samples.

This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those given in tables 5 and 6, and it also can be used to make other useful maps. This information, however, does not eliminate need for further investigations of sites selected for engineering works,

[5] BRADFORD P. BATCHELDER, JR., engineering specialist, Soil Conservation Service, helped to prepare this subsection.

of wildlife habitat and kinds of wildlife—Continued

Wildlife habitat elements—Continued				Kinds of wildlife		
Woodland plants—Continued: Coniferous	Wetland food and cover plants	Shallow water developments	Excavated ponds	Open-land	Woodland	Wetland
Fair	Good	Good	Good	Fair	Good	Good.
Fair	Poor	Unsuited	Unsuited	Fair	Good	Unsuited.
Unsuited	Good	Poor	Unsuited	Unsuited	Unsuited	Fair.
Good	Good	Good	Good	Poor	Good	Good.
Good	Unsuited	Unsuited	Unsuited	Poor	Poor	Unsuited.
Good	Unsuited	Unsuited	Unsuited	Unsuited	Poor	Unsuited.
Poor	Unsuited	Unsuited	Unsuited	Good	Good	Unsuited.
Poor	Unsuited [1]	Unsuited [1]	Unsuited [1]	Good	Good	Unsuited.[1]
Poor	Unsuited [1]	Unsuited [1]	Unsuited [1]	Poor	Fair	Unsuited.[1]

[1] Rating is unsuited where slopes are more than 3 percent.

Figure 16.—Shallow water development in an area of Fresh water marsh. Wildlife habitat suitability is rated as good.

especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths greater than 6 feet. Also, inspection of sites, especially the small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning to soil scientists that is not known to all engineers. The Glossary defines many of these terms commonly used in soil science.

TABLE 5.—*Estimated soil*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that appear in the first column of this table. The symbol < means less than, and the symbol > means wet (Ml), Muck and peat (Mp), Rock outcrop (Ro), and Tidal marsh (Ta)]

Soil series and map symbols	Depth to bedrock	Depth to seasonal high water table	Depth from surface	Classification		
				USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Acton: AcB, AdB, AdC	4+	1–2½	0–6	Fine sandy loam	SM	A–2 or A–4
			6–23	Loamy sand	SM	A–2
			23–42	Loamy coarse sand	SM	A–2
Biddeford: Be	4+	0	0–7	Silty clay loam	ML, CL, OL, or MH	A–4, A–6, or A–7
			7–26	Silty clay	CL or CH	A–6 or A–7
			26–41	Silty clay	CL or CH	A–7
Buxton: BzA, BzB	4+	1–2	0–10	Silt loam	ML	A–4, A–6 or A–7
			10–28	Silty clay loam	ML or ML–CL	A–6 or A–7
			28–43	Silty clay	CL or CL–CH	A–6 or A–7
Charlton: CfB, CfC, CfD, CsB, CsC, CsD, CvD.	4+	3–5+	0–13	Fine sandy loam	SM	A–2 or A–4
			13–36	Fine sandy loam	SM	A–2 or A–4
			36–40	Loamy fine sand	SM	A–2 or A–4
Deerfield: DeA, DeB	6–8+	1–2½	0–16	Loamy sand	SM	A–2
			16–29	Sand	SM or SP–SM	A–2 or A–3
			29–40	Medium and fine sand	SM or SP–SM	A–2 or A–3
Elmwood: EaA, EaB	4+	1½–2½	0–16	Fine sandy loam	SM or ML	A–4
			16–20	Loamy fine sand	SM	A–2 or A–4
			20–43	Silty clay loam	ML or CL	A–6 or A–7
Gloucester: GlB, GlC, GsB, GsC, GsD, GsE, GtD, GtE.	4+	3–5+	0–14	Fine sandy loam	SM	A–2
			14–28	Loamy sand	SM	A–2
			28–40	Gravelly sand and gravelly coarse sand.	SM or SP–SM	A–1 or A–2
Hinckley:						
HaA, HaB, HaC	6–8+	5+	0–16	Loamy sand	SM	A–2
			16–20	Gravelly loamy sand	SM or SP–SM	A–1 or A–3
			20–40	Very gravelly sand	SP or GP	A–1
HbE	6–8+	5+	0–20	Gravelly loamy sand	SM or SP–SM	A–1 or A–3
			20–40	Very gravelly sand	GP	A–1
*Hollis: HcB, HcC, HcD, HdB, HdC, HdD, HeD, HeE, HfB, HfC, HgB, HgC, HgD, HlD, HlE. For the Charlton and Gloucester parts of these mapping units, see Charlton and Gloucester series.	1–2	(2)	0–14	Fine sandy loam	SM	A–2 or A–4
*Leicester: LcB, LeA, LeB, LrA, LrB. For Ridgebury part of LrA and LrB, see Ridgebury series.	4+	0–1	0–5	Fine sandy loam	SM	A–2 or A–4
			5–44	Sandy loam	SM	A–2
Ondawa: On	6–8+	3+	0–30	Fine sandy loam	SM or ML	A–4
			30–42	Loamy fine sand	SM	A–2
Paxton: PbB, PbC, PbD, PdB, PdC, PdD, PdE.	4+	2–3	0–11	Fine sandy loam	SM	A–4
			11–22	Fine sandy loam	SM or SC	A–2 or A–4
			22–41	Sandy loam (fragipan)	SM or SC	A–2 or A–4

Engineering classification systems

The texture of the soils has been classified in table 5 according to the systems used by the U.S. Department of Agriculture (*21*), the American Association of State Highway Officials (AASHO) (*2*), and by the U.S. Department of Defense (Unified system) (*25*). The latter two systems are described in the "PCA Soil Primer" (*12*).

Under the system used by the U.S. Department of Agriculture, soils are classified according to texture, structure, color, and other morphological characteristics. The textual classification is in some ways comparable

properties significant in engineering

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions more than. Properties are not shown for Fresh water marsh (Fa), Gravel and borrow pits (Gv), Made land (Ma), Mixed alluvial land,

Percentage passing sieve[1]— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Permeability	Available water capacity	Shrink-swell potential	Susceptibility to frost action
			Inches per hour	*Inches per inch of soil*		
85–95	80–90	30–40	0. 63–2. 0	0. 13–0. 18	Low	Moderate.
80–90	75–85	20–30	2. 0–6. 3	0. 08–0. 13	Low	Moderate.
70–80	65–75	15–25	2. 0–6. 3	0. 05–0. 08	Low	Moderate.
100	100	80–95	0. 2–0. 63	0. 13–0. 18	Moderate	High.
100	100	85–100	<0. 2	0. 13–0. 18	Moderate	High.
100	100	95–100	<0. 2	0. 13–0. 18	Moderate	High.
100	100	80–95	0. 63 2. 0	0. 18–0. 23	Moderate	High.
100	100	80–95	0. 20–0. 63	0. 18–0. 23	Moderate	High.
100	100	95–100	<0. 2	0. 13–0. 18	Moderate	High.
90–95	80–95	35–45	0. 63–2. 0	0. 13–0. 18	Low	Moderate.
85–90	80–90	30–40	0. 63–2. 0	0. 13–0. 18	Low	Moderate.
80 90	75–85	20–40	2. 0–6. 3	0. 08–0. 13	Low	Moderate.
95–100	95–100	20–30	2. 0–6. 3	0. 08–0. 13	Low	Moderate.
95–100	95–100	5–15	>6. 3	0. 02–0. 08	Low	Moderate.
95 100	90–100	5–20	>6. 3	0. 02–0. 08	Low	Moderate.
100	95–100	35 55	0. 63–2. 0	0. 13–0. 18	Low	Moderate.
100	95–100	25–40	2. 0–6. 3	0. 08–0. 13	Low	Moderate.
100	100	85–95	0. 2–0. 63	0. 13–0. 18	Moderate	High.
75–90	70–80	25–35	0. 63–2. 0	0. 13–0. 18	Low	Low.
80–90	70–80	20–30	2. 0–6. 3	0. 08–0. 13	Low	Low.
70–80	60 70	10–20	2. 0–6. 3	0. 05–0. 08	Low	Low.
80–95	75–90	15–20	>6. 3	0. 05–0. 08	Low	Low.
80–90	60–75	5–15	>6. 3	0. 02–0. 05	Low	Low.
50–65	40–55	0–5	>6. 3	0. 08–0. 13	Low	Low.
70–85	60–75	5–15	>6. 3	0. 05–0. 08	Low	Low.
35–50	30–45	0–5	>6. 3	0. 02–0. 05	Low	Low.
80–90	70–80	30–45	0. 63–2. 0	0. 13–0. 18	Low	Moderate.
85–100	75–90	30–40	0. 63–2. 0	0. 13–0. 18	Low	High.
75–90	70–85	20–35	2. 0–6. 3	0. 13–0. 18	Low	High.
100	95–100	40–55	2. 0–6. 3	0. 13–0. 18	Low	Moderate.
100	90–100	20–30	2. 0–6. 3	0. 08–0. 13	Low	Low.
80–90	75–85	35–45	0. 63–2. 0	0. 13–0. 18	Low	Moderate to high.
80–90	70–80	30–40	0. 63–2. 0	0. 13–0. 18	Low	Moderate to high.
75–85	70 80	30–40	0. 20–0. 63	0. 08–0. 13	Low	Moderate to high.

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to bedrock	Depth to seasonal high water table	Depth from surface	Classification		
				USDA texture	Unified	AASHO
	Feet	*Feet*	*Inches*			
Podunk: Po	6-8+	[3] 1-2	0-30	Fine sandy loam	SM or ML	A-4
			30-42	Loamy fine sand	SM	A-2
Ridgebury: RgA, RgB, RlA, RlB	4+	0-1	0-13	Fine sandy loam and sandy loam.	SM	A-2 or A-4
			13-22	Fine sandy loam	SM	A-2 or A-4
			22-41	Gravelly sandy loam (fragipan).	SM or SC	A-2 or A-4
Rumney: Ru	6-8+	[3] 0-1	0-34	Fine sandy loam	ML	A-4
			34-41	Fine and medium sand	SM or SP-SM	A-2
Saugatuck: Sb	6-8+	0-1	0-7	Loamy sand and sand	SM or SP-SM	A-2
			7-13	Loamy sand	SM	A-2
			13-26	Medium and coarse sand (cemented).	SP, SM or SP-SM	A-1 or A-3
			26-42	Fine, medium, and coarse sand.	SP or SP-SM	A-1 or A-3
Scantic: ScA, ScB	4+	0-1	0-13	Silt loam	MH or ML	A-7
			13-23	Silty clay loam	CL, CH, or ML-CL	A-6 or A-7
			23 40	Silty clay	CL or ML-CL	A-6 or A-7
Suffield: SfC, SfE	4+	3+	0-19	Silt loam	ML or CL	A-4 or A-6
			19-28	Silty clay loam	ML or ML-CL	A-6 or A-7
			28-41	Silty clay	ML or CL	A 6 or A-7
Suncook: Sk	6-8+	[3] 3+	0-18	Loamy sand	SM or SP-SM	A-2 or A-3
			18-40	Sand	SP	A 3
Sutton: SnB, SuB	4+	1-2½	0-24	Fine sandy loam	SM	A-2 or A-4
			24-40	Fine sandy loam	SM	A-2
Swanton: SwA, SwB	4+	0-1	0-19	Fine sandy loam and very fine sandy loam.	SM	A-4
			19-26	Silty clay loam	ML or CL	A-6 or A-7
			26-41	Silty clay	ML or CL	A-6 or A-7
Whitman: Wa	4+	0	0-7	Fine sandy loam and very fine sandy loam.	SM or ML	A-2 or A-4
			7-17	Sandy loam	SM	A-2 or A-4
			17-41	Gravelly sandy loam (fragipan at a depth of more than 34 inches).	SM	A-2
Windsor: WdA, WdB, WdC, WdE	6-8+	5+	0-16	Loamy sand	SM	A-2
			16-68	Loamy fine sand and sand	SP or SP-SM	A-3
Windsor, clay subsoil variant: WfB, WfC.	4-6+	2-3	0-26	Loamy fine sand and fine sand.	SM	A-2 or A-4
			26-30	Silt loam	ML	A-4 or A-6
			30-42	Silty clay loam	ML or CL	A-6 or A-7
Woodbridge: WgB, WsB, WsC	4+	1-2½	0-7	Fine sandy loam	SM	A-4
			7-26	Fine sandy loam	SM	A-2 or A-4
			26-42	Gravelly fine sandy loam (fragipan).	SM or SC	A-2 or A-4

[1] Based on total material. Estimates corrected for material from 3 to 10 inches in diameter.
[2] Seasonal high water table above bedrock.

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Percentage passing sieve [1]—			Permeability	Available water capacity	Shrink-swell potential	Susceptibility to frost action
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
			Inches per hour	*Inches per inch of soil*		
100	100	40–60	2. 0–6. 3	0. 13–0. 18	Low	Moderate.
100	95–100	20–30	2. 0–6. 3	0. 08 0. 13	Low	Moderate.
80–90	75–85	30–45	0. 63–2. 0	0. 13–0. 18	Low	High.
80–90	75–85	30–40	0. 63–2. 0	0. 13–0. 18	Low	High.
80–90	75–85	30–40	0. 20–0. 63	0. 08–0. 13	Low	High.
100	95–100	50–60	2. 0–6. 3	0. 13–0. 18	Low	High.
100	80–95	10–25	>6. 3	0. 08–0. 13	Low	High.
95–100	90–100	10–25	2. 0–6. 3	0. 08–0. 13	Low	High.
95–100	90–100	15–25	2. 0–6. 3	0. 08–0. 13	Low	High.
90–100	85–95	2–15	0. 20–0. 63	0. 02–0. 08	Low	High.
95–100	85–100	2–10	>6. 3	0. 02–0. 08	Low	High.
100	100	90–95	0. 2–0. 63	0. 18–0. 23	Moderate	High.
100	100	95–100	0. 2–0. 63	0. 18–0. 23	Moderate	High.
100	100	95–100	<0. 2	0. 13–0. 18	Moderate	High.
100	95–100	75–85	0. 63–2. 0	0. 18–0. 25	Low	High.
100	100	80–95	0. 2–0. 63	0. 18–0. 23	Moderate	High.
100	100	90–100	<0. 2	0. 13–0. 18	Moderate	High.
90–100	85–100	5–20	2. 0–>6. 3	0. 08 0. 13	Low	Low.
90–100	80–90	2–5	>6. 3	0. 02–0. 08	Low	Low.
85–95	80–90	30–40	0. 63–2. 0	0. 13 -0. 18	Low	Moderate.
85–90	70–85	25–35	0. 63–2. 0	0. 13–0. 18	Low	Moderate.
100	95–100	35–45	0. 63–2. 0	0. 13–0. 18	Low	High.
100	100	80–90	0. 20–0. 63	0. 13–0. 18	Moderate	High.
100	100	90–100	<0. 2	0. 13–0. 18	Moderate	High.
80–100	75–90	30–60	0. 63–2. 0	0. 13–0. 18	Low	High.
80–100	70–85	20–40	0. 63–2. 0	0. 13–0. 18	Low	High.
70–90	65–80	20–35	0. 20–0. 63	0. 08–0. 13	Low	High.
90–100	80–90	15–20	>6. 3	0. 02–0. 08	Low	Low.
90–100	85–95	2–10	>6. 3	0. 02–0. 08	Low	Low.
95–100	95–100	20–40	2. 0–6. 3	0. 08–0. 13	Low	Low.
100	95–100	70–80	0. 63–2. 0	0. 18–0. 23	Low	Moderate.
100	100	80–95	0. 20–0. 63	0. 13 0. 18	Moderate	Moderate.
85–95	80–90	35–45	0. 63–2. 0	0. 13–0. 18	Low	Moderate to high.
80–90	75–85	30–40	0. 63–2. 0	0. 13–0. 18	Low	Moderate to high.
80–90	70–80	30–40	0. 20–0. 63	0. 08–0. 13	Low	Moderate to high.

[3] Periodically flooded.

TABLE 6.—*Interpretations*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear in the first column of this table. Gravel and borrow pits (Gv)

Soil series and map symbols	Suitability as source of—			
	Topsoil [1]	Sand	Gravel	Road fill
Acton: AcB, AdB, AdC	Fair	Not suitable	Not suitable	Fair to good
Biddeford: Be	Poor	Not suitable	Not suitable	Not suitable
Buxton: BzA, BzB	Fair	Not suitable	Not suitable	Poor
Charlton: CfB, CfC, CfD, CsB, CsC, CsD, CvD.	Good	Not suitable	Not suitable	Good
Deerfield: DeA, DeB	Fair	Fair: poorly graded; mostly fine sands.	Poor	Good
Elmwood: EaA, EaB	Good	Not suitable	Not suitable	Fair in subsoil; poor in substratum.
Fresh water marsh: Fa	Not suitable	Not suitable	Not suitable	Not suitable
Gloucester: GlB, GlC, GsB, GsC, GsD, GsE, GtD, GtE.	Fair	Poor	Poor	Good
Hinckley: HaA, HaB, HaC, HbE	Poor	Good: sand, gravel, and cobblestones mixed.	Good: sand, gravel, and cobblestones mixed.	Good
*Hollis: HcB, HcC, HcD, HdB, HdC, HdD, HeD, HeE, HfB, HfC, HgB, HgC, HgD, HlD, HlE. For the Charlton and Gloucester parts, see the Charlton and Gloucester series.	Fair	Not suitable	Not suitable	Poor: bedrock within 20 inches of surface.
*Leicester: LcB, LeA, LeB, LrA, LrB. For Ridgebury part of LrA and LrB, see Ridgebury series.	Poor	Not suitable	Not suitable	Fair
Mixed alluvial land, wet: Ml	Fair	Not suitable	Not suitable	Poor

of the soils for engineering

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for Made land (Ma), and Rock outcrop (Ro) are so variable that interpretations for them were not made]

Soil features affecting—					
Highway location	Ponds		Drainage	Irrigation	Diversions, terraces, and waterways
	Reservoir areas	Embankment [2]			
High water table; seepage; stoniness.	High water table; moderately rapid permeability.	Moderate permeability; fair stability; stoniness.	High water table; seepage; stoniness.	High water table; low available water capacity.	Stoniness; seepage; erodible.
High water table; severe frost action; low shear strength; moderate shrink-swell potential.	High water table; slow permeability.	Erodible; fair stability.	High water table; slow permeability.	(3)	(3).
High water table; severe frost action.	High water table; slow permeability.	Erodible; fair stability.	High water table; slow permeability.	High water table; high available water capacity; slow permeability.	High water table; seepage; erodible.
Stoniness	Moderate permeability; stoniness.	Moderate permeability; stable; stoniness.	(3)	Moderate available water capacity.	Stoniness; erodible.
High water table; unstable cut slopes.	High water table; moderately rapid permeability.	Moderately rapid permeability; fair to poor resistance to piping.	High water table; moderately rapid permeability.	High water table; low available water capacity.	High water table; erodible; difficult to vegetate.
High water table; moderate to severe frost action.	High water table; moderately slow permeability in substratum.	Moderate permeability in subsoil; fair stability in substratum.	High water table; moderate permeability in subsoil; moderately slow permeability in substratum.	High water table; moderate available water capacity; moderate intake rate.	High water table; seepage; erodible.
Ponded most of the year; high compressibility.	Ponded most of the year.	(3)	(3)	(3)	(3).
Stoniness	Moderately rapid permeability; stoniness.	Moderate permeability; fair stability; stoniness.	(3)	Low available water capacity; rapid intake rate.	Stoniness; erodible.
Difficult to vegetate cut slopes.	Rapid permeability	Moderately rapid permeability; fair to good stability.	(3)	Very low available water capacity; rapid intake rate.	Sand and gravel layers below 16 to 20 inches; difficult to vegetate; erodible.
Bedrock within 20 inches of surface; seepage over bedrock; moderate frost action.	Bedrock within 20 inches of surface.	Moderate permeability; bedrock within 20 inches of surface.	(3)	Moderate available water capacity; bedrock within 20 inches of surface.	Bedrock within 20 inches of surface.
High water table; severe frost action; stoniness.	Moderately rapid permeability; high water table; seepage; stoniness.	Moderate permeability; high water table; stable; stoniness.	High water table; stoniness.	(3)	High water table; stoniness; erodible.
High water table; subject to flooding.	Variable permeability; subject to flooding.	Variable material	High water table; subject to flooding; variable permeability.	(4)	(3).

TABLE 6.—*Interpretations of*

Soil series and map symbols	Suitability as source of—			
	Topsoil [1]	Sand	Gravel	Road fill
Muck and peat: Mp	Poor	Not suitable	Not suitable	Not suitable
Ondawa: On	Good	Poor to not suitable	Not suitable	Good
Paxton: PbB, PbC, PbD, PdB, PdC, PdD, PdE,	Good	Not suitable	Not suitable	Fair
Podunk: Po	Good	Poor	Not suitable	Fair
Ridgebury: RgA, RgB, RlA, RlB	Poor	Not suitable	Not suitable	Fair
Rumney: Ru	Fair	Not suitable	Not suitable	Poor
Saugatuck: Sb	Poor	Fair: poorly graded; mostly fine sands.	Not suitable	Fair
Scantic: ScA, ScB	Poor	Not suitable	Not suitable	Not suitable
Suffield: SfC, SfE	Fair	Not suitable	Not suitable	Poor
Suncook: Sk	Poor	Good below 18 inches.	Not suitable	Good
Sutton: SnB, SuB	Good	Not suitable	Not suitable	Fair
Swanton: SwA, SwB	Fair	Not suitable	Not suitable	Fair to poor

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Soil features affecting—					
Highway location	Ponds		Drainage	Irrigation	Diversions, terraces, and waterways
	Reservoir area	Embankment[2]			
High water table; poor stability; high compressibility.	High water table; variable stability.	(3)	High water table; poor stability; high compressibility; outlet problems.	(3)	(3).
Subject to flooding	Moderately rapid permeability; subject to flooding.	Moderate permeability; fair stability; poor resistance to piping.	Subject to flooding	Moderate available water capacity and intake rate.	Erodible.
Seepage in cut slopes; moderate to severe frost action; stoniness.	Moderately slow permeability in compact layer; stoniness.	Slow permeability; stoniness.	Seepage along top of compact layer; stoniness.	Moderate available water capacity and intake rate.	Seepage along top of compact layer; stoniness; erodible.
Subject to flooding; high water table.	Moderately rapid permeability; subject to flooding.	Moderate permeability; fair stability; poor resistance to piping.	Subject to flooding; high water table; ditchbanks may be unstable.	Moderate available water capacity and intake rate; high water table.	High water table; erodible.
High water table; severe frost action; stoniness.	High water table; moderately slow permeability; stoniness.	High water table; slow permeability; stoniness.	High water table; moderately slow permeability; stoniness.	High water table	High water table; seepage in compact layer; stoniness; erodible.
High water table; subject to flooding; severe frost action.	Moderately rapid permeability; subject to flooding.	Moderate permeability; poor resistance to piping.	Subject to flooding; moderately rapid permeability; high water table.	High water table	(3).
High water table; unstable cut slopes; highly erodible; severe frost action.	Rapid permeability below cemented pan; high water table.	Moderately rapid permeability; fair to poor stability and resistance to piping.	Subject to sloughing; high water table.	Low available water capacity; rapid intake rate.	High water table; highly erodible; difficult to vegetate.
High water table; severe frost action; variable strength.	High water table; slow permeability.	High water table; slow permeability; fair to good stability.	High water table; slow permeability.	(3)	(3).
Severe frost action; erodible.	Slow permeability	Erodible; fair to poor stability; poor resistance to piping.	(3)	High available water capacity; highly erodible.	Highly erodible.
Subject to flooding	Rapid permeability; subject to flooding.	Rapid permeability; fair to poor resistance to piping.	Subject to flooding	Very low available water capacity.	(3).
High water table; stoniness.	High water table; moderate permeability; stoniness.	High water table; moderate permeability; stoniness.	High water table; seepage; stoniness.	Moderate available water capacity; high water table.	Seasonal high water table; stoniness; erodible.
High water table; severe frost action.	High water table; slowly permeable substratum.	Moderately permeable subsoil; fair stability in substratum.	High water table; moderate permeability in subsoil; slow permeability in substratum.	(3)	(3).

TABLE 6.—*Interpretations of*

Soil series and map symbols	Suitability as source of—			
	Topsoil [1]	Sand	Gravel	Road fill
Tidal marsh: Ta	Not suitable	Not suitable	Not suitable	Not suitable
Whitman: Wa	Poor	Not suitable	Not suitable	Fair
Windsor: WaA, WdB, WdC, WdE	Poor	Fair: poorly graded mostly fine sands.	Not suitable	Fair to good
Windsor, clay subsoil variant: WfB, WfC	Poor	Poor: silt and clay below 26 inches.	Not suitable	Fair to poor
Woodbridge: WgB, WsB, WsC	Good	Not suitable	Not suitable	Fair

[1] The rating does not include the stony or rocky phases of the respective series.
[2] Permeability for embankments refers to the soil material where compacted.

TABLE 7.—*Engineering*

[Tests performed by the Bureau of Public Roads (BPR) in accordance with

Soil name and location	Parent material	Bureau of Public Roads report No.	Depth
			Inches
Buxton silt loam: 0.5 mile N. of U.S. Route 4 and E. of Back River Rd. (Modal)	Marine silt and clay deposits.	44291	0–9
		44292	15–22
		44293	22–40
0.5 mile NE. of Strafford County Farm. (Higher content of silt in the upper part of profile than modal)	Marine silt and clay deposits.	44294	0–6
		44295	6–10
		44296	18–27
500 feet N. of B&M Railroad crossing on State Route 155. (Sandier than modal)	Marine silt and clay deposits.	44297	0–10
		44298	10–16
		44299	22–32

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Soil features affecting—					
Highway location	Ponds		Drainage	Irrigation	Diversions, terraces, and waterways
	Reservoir area	Embankment [2]			
Tidal flooding; excessive settlement.	(3)	(3)	Tidal flooding; salinity; outlet problems.	(3)	(3).
High water table; severe frost action; stoniness.	High water table; moderately slow permeability.	High water table; moderately slow permeability; stoniness.	High water table; compact substratum.	(3)	(3).
Erodible; difficult to vegetate.	Rapid permeability	Rapid permeability; poor to fair resistance to piping.	(3)	Very low available water capacity; rapid intake rate.	Erodible; difficult to vegetate.
Erodible; difficult to vegetate; moderate frost action in substratum.	Moderately rapid permeability in upper 26 inches; moderately slow permeability below 26 inches.	Moderately slow permeability in substratum; fair stability.	(3)	Low available water capacity in subsoil; moderate available water capacity in substratum.	Moderately slow permeability in substratum; erodible.
High water table; seepage along compact layer; moderate to severe frost action; stoniness.	High water table; moderately slow permeability.	High water table; stoniness.	High water table; seepage along compact layer; stoniness.	Moderate available water capacity; high water table.	High water table; seepage along compact layer; stoniness; erodible.

[3] Soil features are not given, because the engineering use or practice generally is not needed or is not applicable, the soils are not suited, or the range of properties of the mapping unit is so wide that it is not practical to list them.

test data

standard procedures of the American Association of State Highway Officials (AASHO)]

Mechanical analysis [1]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve—						Percentage smaller than—						AASHO [2]	Unified [3]
3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
-------	------	--------	100	97	92	89	75	47	31	50	15	A-7-5(12)	ML
-------	-------	--------	100	96	93	91	83	58	43	42	18	A-7-6(12)	ML-CL
-------	-------	--------	--------	--------	99	98	86	62	45	41	18	A-7-6(11)	CL
-------	-------	--------	100	99	96	94	75	42	24	50	12	A-7-5(11)	ML
-------	-------	--------	100	99	96	94	73	42	26	42	11	A-7-5(9)	ML
-------	-------	--------	--------	--------	99	97	78	56	42	39	16	A-6(10)	CL
-------	98	97	95	92	79	68	42	22	11	43	9	A-5(9)	ML
-------	-------	--------	100	98	91	81	37	16	8	37	3	A-4(8)	ML
-------	-------	--------	100	99	95	88	61	39	28	34	12	A-6(9)	ML-CL

TABLE 7.—*Engineering*

Soil name and location	Parent material	Bureau of Public Roads report No.	Depth
			Inches
Charlton fine sandy loam:			
250 yards SW. of junction of Clark Rd. and State Route 202A. (Modal)	Glacial till from schist. (Glacial uplands).	44300 44301 44302	0–8 13–22 36–40
0.5 mile W. of Lee Center, 0.25 mile N. of Little River. (Finer textured and higher content of coarse fragments than modal; sampled in an area mapped as Hollis-Charlton fine sandy loams, 3 to 8 percent slopes)	Glacial till from schist. (Glacial uplands).	44303 44304 44305	0–10 10–16 25–40
2.25 miles NW. of Bow Lake Village, 200 yards N. of Bow Lake. (Finer textured and firmer substratum than modal)	Glacial till. (Drumlin).	44306 44307 44308	0–8 8–13 21–30
Elmwood fine sandy loam:			
0.25 mile E. of Leehook Rd., 150 yards W. of Lee-Durham town line. (Modal)	Marine silt and clay deposits.	44312 44313 44314	0–8 16–20 27–48
University of New Hampshire field on S. side of Mast Rd., ⅜ mile W. of U.S. Route 4. (Sandier in upper part of profile than modal; sampled in an area mapped as Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes)	Marine silt and clay deposits.	44309 44310 44311	0–10 13–20 30–48
0.3 mile NW. of State Route 108 off Freshet Rd. (Sandier surface layer than modal)	Marine silt and clay deposits.	44315 44316 44317	0–7 7–16 29–48
Scantic silt loam:			
200 feet W. of Back River Rd., 200 yards N. of U.S. Route 4. (Modal)	Marine silt and clay deposits.	44327 44328 44329	0–13 13–23 23–36
0.5 mile N. of Durham village, 250 yards SE. of junction of Mast Rd. and U.S. Route 4. (Higher content of silt than modal)	Marine silt and clay deposits.	44330 44331 44332	0–7 13–23 23–41
0.5 mile S. of Lamprey River, 200 yards W. of Packers Falls Rd. (Higher content of silt in upper part of subsoil than modal)	Marine silt and clay deposits.	44333 44334 44335	0–5 12–18 18–41
Windsor loamy sand, clay subsoil variant:			
0.5 mile SE. of Lee Center on E. side of Leehook Rd. (Modal)	Marine silt and clay deposits.	44321 44322 44323	0–10 10–16 30–42
0.25 mile NW. of State Route 108 off Freshet Rd. (Finer textured in upper part of profile than modal; sampled in area mapped as Windsor loamy sand, 3 to 8 percent slopes)	Marine silt and clay deposits.	44318 44319 44320	0–10 10–16 34–52
0.3 mile SE. of Gonic and S. of Pickering Rd. across Cocheco River from country club. (Sandier in lower part of profile than modal)	Marine silt and clay deposits.	44324 44325 44326	0–7 7–17 22–33

[1] Mechanical analysis according to the AASHO Designation T 88–57 (*2*). Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

test data—Continued

Mechanical analysis [1]										Liquid limit	Plasticity index	Classification	
Percentage passing sieve—						Percentage smaller than—							
3-in.	¾-in.	No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.			AASHO [2]	Unified [3]
-------	96	89	86	78	37	33	23	12	10	[4] NP	[4] NP	A-4(0)	SM
-------	96	88	85	74	31	24	19	13	10	NP	NP	A-2-4(0)	SM
100	93	86	82	71	23	17	9	5	4	NP	NP	A-2-4(0)	SM
-------	99	97	95	82	40	32	15	10	8	NP	NP	A-4(1)	SM
[5] 100	95	93	90	81	40	30	14	6	5	NP	NP	A-4(1)	SM
-------	96	87	81	71	48	42	24	8	6	NP	NP	A-4(3)	SM
-------	97	94	91	79	38	33	23	13	10	32	7	A-4(1)	SM-SC
100	98	95	93	81	36	32	23	12	9	NP	NP	A-4(0)	SM
-------	97	94	92	81	38	32	26	13	9	NP	NP	A-4(1)	SM
-------	-------	-------	100	95	51	42	26	15	11	NP	NP	A-4(3)	ML
-------	-------	-------	100	91	38	31	28	20	17	NP	NP	A-4(1)	SM
-------	-------	-------	100	99	91	87	78	60	46	38	16	A-6(10)	CL
-------	-------	-------	100	93	43	37	30	20	14	33	5	A-4(2)	SM
-------	-------	-------	100	89	24	18	13	10	6	NP	NP	A-2-4(0)	SM
-------	-------	-------	100	99	94	92	84	61	46	42	18	A-7-6(12)	ML-CL
-------	-------	-------	100	91	34	27	18	11	8	NP	NP	A-2-4(0)	SM
-------	-------	-------	100	91	36	28	17	12	9	NP	NP	A-4(0)	SM
-------	-------	-------	100	99	92	91	85	67	50	41	19	A-7-6(12)	CL
-------	-------	-------	100	96	93	91	79	52	35	62	22	A-7-5(17)	MH
-------	-------	-------	100	99	98	97	90	73	59	54	27	A-7-6(18)	CH
-------	-------	-------	-------	-------	99	98	92	75	59	48	21	A-7-6(14)	ML-CL
-------	-------	-------	100	97	93	92	81	50	34	58	16	A-7-5(14)	MH
-------	-------	-------	-------	-------	99	98	88	60	44	43	18	A-7-6(12)	ML-CL
-------	-------	-------	-------	-------	99	98	86	59	45	43	18	A-7-6(12)	ML-CL
-------	-------	-------	100	97	94	92	79	52	34	52	14	A-7-5(12)	MH
-------	-------	-------	100	99	96	95	87	62	45	45	21	A-7-6(13)	CL
-------	-------	-------	100	99	98	96	91	70	54	44	20	A-7-6(13)	CL
-------	100	98	96	89	35	29	17	10	7	NP	NP	A-2-4(0)	SM
-------	-------	-------	100	95	28	19	13	8	6	NP	NP	A-2-4(0)	SM
-------	-------	-------	-------	100	96	93	83	60	46	40	16	A-6(10)	ML-CL
-------	-------	-------	100	94	32	21	15	10	8	NP	NP	A-2-4(0)	SM
-------	-------	-------	100	96	36	25	14	10	7	NP	NP	A-4(0)	SM
-------	-------	-------	100	99	91	87	73	54	37	41	19	A-7-6(12)	CL
-------	-------	-------	100	99	41	30	18	11	9	NP	NP	A-4(1)	SM
-------	-------	-------	100	99	36	27	19	12	8	NP	NP	A-4(0)	SM
-------	-------	-------	100	98	78	73	54	34	24	30	7	A-4(8)	ML-CL

[2] Based on AASHO Designation M 145-49 (*2*).

[3] Based on the Unified Soil Classification System (*25*). The Soil Conservation Service and Bureau of Public Roads have agreed that all soils having plasticity indexes within 2 points from A-line are to be given a borderline classification. An example of this is ML-CL.

[4] NP=Nonplastic.

[5] Based on sample as received in laboratory. In field sampling, 10 percent of the material greater than 3 inches in diameter was discarded. Laboratory test data were not corrected for amount discarded in field sampling.

to the systems used by engineers. Textural classes used in the USDA system are defined in the Glossary in the back of this soil survey.

The AASHO system is used to classify soils according to the properties that affect use in highway construction. In this system a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength. These are the best soils for subgrade (foundation). At the other extreme are the clay soils that have low strength when wet. The best soils for subgrade are, therefore, classified as A–1; the next best, A–2; and so on to class A–7, the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–2 and A–7 groups are divided as follows: A–2–4, A–7–5, and A–7–6. If soil material is near a classification boundary, it is given a symbol showing both classes; for example, A–2 or A–4. Within each group, the relative engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 for the poorest. The AASHO classification for tested soils, with index numbers in parentheses, is shown in table 7. The estimated classification for all soils mapped in the survey area is given in table 5.

In the Unified Soil Classification System, soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content. In this system the soils are divided into three classes: (1) coarse grained, (2) fine grained, and (3) highly organic. The coarse-grained soils are divided into eight groups ranging from well-graded clean gravel (GW) to clayey sand (SC). The fine-grained soils are divided into six groups, ranging from silty soil that has a low liquid limit (ML) to organic silt and clay that have a high liquid limit (OH). Highly organic soil is classified as Pt. In table 5 the word "or" is used between classification symbols to indicate a range, for example, SP or SM. The Unified Soil Classification System is used by the Soil Conservation Service in engineering work.

Estimated properties of the soils

Table 5 gives some estimated soil properties that are important in engineering. The estimates are based on field classification and descriptions, physical and chemical tests of selected representative samples, test data from comparable soils in adjacent areas, and from experience of soil scientists and engineers working with the specific soil in the survey area. As the estimates are only for typical soils, some variation from these values can be expected. Normally, soil investigations for the survey did not extend below depths of 3½ to 5 feet. Also included in mapping were small spots of soils that differ from the dominant soil for which the mapping unit was named. As a consequence, onsite determinations are necessary for most uses, especially those that require deep excavations.

In many places soils of the Biddeford, Buxton, Scantic, and Swanton, series are underlain with saturated clay, silt, or sand that has a low bearing capacity. A thorough investigation and testing of these soils is needed as part of the engineering of large structures such as highways, buildings, bridges, and dams.

Seeps and springs are common in Buxton and Elmwood soils. They generally appear near the boundary between these soils and the more pervious soils that are at higher elevations. These seeps may be caused by the change in permeability resulting from the change in texture or structure of the soils. Thorough investigations are required to determine suitable locations for tile drains that are generally installed to correct these problems.

Soils of the Paxton, Ridgebury, and Woodbridge series are highly susceptible to frost heaving. Engineering design of structures and highways on these soils should include measures to protect against damage from frost heaving.

More detailed information about each soil is contained in the section "Descriptions of the Soils."

Permeability, as used in table 5, relates only to movement of water downward through undisturbed and uncompacted soils. It does not include lateral seepage or upward movement under artesian pressure. The estimates are based mainly on structure and porosity of the soil and on tests of undisturbed cores of similar soils.

Available water capacity is the approximate amount of capillary water in the soil available for plant growth after all free water has drained away.

Shrink-swell potential indicates the degree of volume change to be expected with a change in moisture content. It is estimated primarily on the basis of the amount and type of clay present.

Susceptibility to frost action was estimated for the soils as they occur in place. Frost action is the heaving caused by ice lenses forming in the soil and the subsequent loss of strength as a result of excess moisture during thawing periods. Soils that have a high percentage of silt and very fine sand are highly susceptible to frost action.

Reaction, expressed as a pH value, is not shown in table 5. Most of the soils in Strafford County generally range in pH from 5.0 to 7.0.

Engineering interpretations

Table 6 rates the soils as sources of topsoil, sand, gravel, and road fill. The table also lists certain typical engineering activities and indicates the soil features that are particularly significant to each type of engineering work. The ratings and other interpretations in the table are based on estimated engineering properties of the soils in table 5; on available test data, including those in table 7; and on field experience.

The suitability of soils as a source of topsoil is based on productivity, texture, thickness of suitable layers, presence of gravel, stones, or cobblestones, and difficulty in obtaining the material (because of wetness, for example). Topsoil refers to soil material used as topdressing for lawns, gardens, ditchbanks, roadbanks, and the like. Normally, only the surface layer is removed for topsoil. Soils that are wet, shallow to bedrock, sandy, or gravelly are poor or unsuitable sources of topsoil.

Sand or gravel ratings are based on the probability that delineated areas of the soil contain deposits of sand or gravel. The ratings do not indicate quality or size of the deposits. Soils in AASHO classification A–1 or A–3 are suitable sources of sand, and those classified as A–1

are suitable sources of gravel. In Strafford County only Hinckley soils are good sources of sand and gravel.

Suitability ratings for road fill material are based on the performance of the soil material when excavated and used as borrow for highway subgrade. Major factors considered in making the ratings are load-carrying capacity, susceptibility to frost action, compaction characteristics, workability, depth to water table, and depth to bedrock. Soils in AASHO classification A–1 or A–3 are good. Those in A–2 are good below frost depth, those in A–4 are fair, and soils classified as A–6 or A–7 are poor to not suitable.

Highway location is influenced by features of the undisturbed soil that affect construction and maintenance of highways. Some of the factors affecting use are compressibility, the hazards of flooding and seepage, stability of slopes, susceptibility to frost action, and depth to water table and to bedrock (fig. 17). In soils that are moderately well drained to very poorly drained, a seasonal high water table makes earthwork difficult and may limit working time to July and August. If highway cuts are to be located where the water table is high, interceptor drains or under drains may be required. Roadways in most areas that are subject to flooding need embankments. Seepage along the slopes of cuts may cause slumping or sliding of the underlying material. Highway routes that avoid deep cuts in bedrock may help to reduce construction costs. When highways are located in areas of highly compressible organic materials such as muck and peat, these materials must be removed and replaced with more desirable backfill.

In the construction of ponds, a particular soil feature may be a problem in the reservoir area but not in the embankment. Permeability, stability, shrink-swell potential, resistance to piping, depth to water table, and depth to bedrock are some of the major factors considered. Interpretations can be made from these columns for the construction of dikes, levees, lagoons, and sedimentation pools.

The installation and performance of surface and subsurface drainage systems are affected by soil features including depth to water table, seepage, permeability, flooding, sloughing, and depth to bedrock.

Figure 17.—**Newly constructed highway passing through an area of Hollis soils, which are shallow to bedrock and are on a landform that has pockets of deeper soils.**

Features that affect the design of an irrigation system are soil depth, available water capacity, water-intake rate, need for drainage, and presence of layers limiting water movement. In Strafford County only sprinkler irrigation was considered.

Some of the features that influence the construction and maintenance of diversions, terraces, and waterways are erodibility, seepage, depth to bedrock or to pan layers, presence of stones or rock outcrops, and difficulty in obtaining good vegetative cover.

Engineering test data

Table 7 contains the results of engineering tests performed by the Bureau of Public Roads on several important soils in Strafford County. The table shows where samples were taken, gives depth to which sampling was done, and gives the results of tests to determine particle-size distribution and other properties significant in soil engineering. One profile of each series represents the central, or modal, concept of the series. The other two profiles are from soils that have distinctly different texture, depth of profile, and other characteristics that vary from the central concept but which are within the range established for the series. All samples in table 7 were obtained at specific depths as indicated in the table; therefore, the test data should not be used as a basis for estimating the properties of layers below the sampled layer.

The profile description of the Buxton soil listed as modal in table 7 is not included in this survey. Accumulation of iron and organic matter was not evident in the B horizon. Otherwise, all other characteristics are within the range of the series.

Mechanical analyses show the percentages, by weight, of soil particles that pass sieves of specified sizes. Sand and other coarser materials do not pass through the No. 200 sieve. Silt and clay pass through the No. 200 sieve. Silt is material larger than 0.002 millimeter in diameter that passes through the No. 200 sieve; and clay is that fraction passing through the No. 200 sieve that is smaller than 0.002 millimeter in diameter. The clay fraction was determined by the hydrometer method rather than by the pipette method, which is used by most soil scientists to determine the clay in soil samples.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from semisolid to plastic. The liquid limit is the moisture content at which the material changes from plastic to liquid. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic.

Soils in Recreational Development

This subsection contains information about the suitability of the soils for outdoor recreational use. The in-

formation does not preclude the requirement for more detailed onsite investigations, and specific recommendations for the use of the soils are not given. The sections "General Soil Map," "Descriptions of the Soils," and "Soils in Engineering" contain additional information useful in planning the use and development of outdoor recreation sites.

Table 8 (p. 72) gives the estimated degree and kind of limitation for each soil for specified recreational uses. In the table, ratings of slight, moderate, or severe are given to indicate the degree to which the suitability of a soil for a given use may be affected by limitations. When a specific limitation is estimated to be either moderate or severe, that limitation is named in the table. The following soil features were considered in the ratings: depth to the water table, wetness and natural drainage, depth to bedrock, steepness of slope, soil permeability, surface stoniness, surface rockiness, surface soil texture, and flood hazard from stream overflow.

A rating of *slight* indicates that the soil has few or no limitations and is considered desirable for the use named. Soils with a rating of *moderate* have one or more limitations that generally can be overcome or corrected. A rating of *severe* indicates that use of the soils is seriously limited by a hazard or restriction that is difficult to overcome. The rating does not imply, however, that a soil cannot be put to the specific use.

The ratings of the mapping units in the table indicate what can be expected for areas delineated on the soil map. Local variations within these delineated mapping units require onsite examination to determine the nature and extent of the variations. Some of these variations, or mapping inclusions, are described under the mapping unit description in the section "Descriptions of the Soils."

The recreational uses for which soils are rated in table 8 are discussed in the following paragraphs.

Buildings without basements include cottages, summer homes, lodges, and service buildings. It is assumed that construction will be on concrete, wood, or steel columns. Problems of sewage disposal, water supply, access roads, or stabilizing or maintaining vegetative cover are not considered.

Soil limitations for sanitary facilities are for the disposal of effluent from a septic system by means of a filter or leach field. The success of this kind of disposal system depends on the absorptive quality of the soil and on the level of the water table during wet seasons. Ratings are based on use during the 3-month period in summer. Onsite investigation is necessary to accurately determine the suitability of a soil for this use.

Campsites include sites for trailers and tents. These areas provide picnic tables, fireplaces, and an unsurfaced parking area at each site to accommodate large groups of people. More nearly level areas are required for sites for trailers than for tents because of the larger types of vehicles involved. Sewage disposal, water supply, and access roads are not considered.

In table 8 two types of play areas are rated, athletic fields and parks and picnic areas. Athletic fields are those areas used as playing fields or courts for baseball, football, volleyball, soccer, or other team sports in which soils are subject to heavy foot traffic. Importation of fill material or topsoil is not considered. Parks and picnic areas are for less concentrated use, such as walking, running, and picnics. Water supply and sewage disposal are not considered.

Ratings for roads and parking areas are based on soil properties that limit layout and construction of unpaved roads and parking areas used to provide access and parking within the recreational area. Examples of these properties are depth to the water table, depth to bedrock, and slope. Information for paved or Macadam roads and parking lots is given in the subsection "Soils in Community Development."

Vegetative cover ratings are for the establishment and maintenance of grass cover only. For information about trees, see the subsection "Soils in Woodland Management."

Soils in Community Development

Residential, commercial, and industrial development in Strafford County have expanded into farming areas of the county. The problems that have resulted show the need for careful planning and a thorough understanding of the physical and economic aspects involved when the use of the soils is changed.

Planning officials, developers, builders, and homeowners (fig. 18) can find useful information on the soil maps in the back of this survey and in the table and text in this subsection. Also, additional information can be obtained from the sections "Soils in Engineering" and "Descriptions of the Soils."

In table 9 (p. 79) the estimated limitations of the soils for specified uses in community development are rated as slight, moderate, and severe. If the limiting feature or features of a given soil are rated as moderate or severe, the feature or features are named in the table.

A rating of *slight* indicates that the soil has few to no limitations and is considered desirable for the use named. Soils with a rating of *moderate* have one or more limitations that usually can be overcome or corrected. A rating of *severe* indicates that use of the soils is seriously limited by a hazard or restriction that is difficult to overcome. The rating does not imply, however, that the soil cannot be put to the specific use.

The ratings of the limitations in the table indicate what can be expected for mapping units delineated on the soil map. Local variations within these delineated mapping units require onsite examination to determine the nature and extent of the variations. Some of these variations or mapping inclusions are described under the mapping unit description in the section "Descriptions of the Soils."

The community development aspects listed in table 9 are discussed in the following paragraphs.

Homesite foundations are for year-round buildings in community subdivisions. The buildings are three stories or less and have basements that extend to a depth of at least 5 feet below ground level (fig. 19). The main soil features affecting this use are depth to water table, natural drainage, steepness of slope, depth to bedrock, stoniness, rockiness, and hazard of flooding.

Septic tank sewage effluent disposal refers to the disposal of effluent from a septic tank system by means of a filter or leach field. Year-round use is assumed. The successful operation of a septic tank system depends on

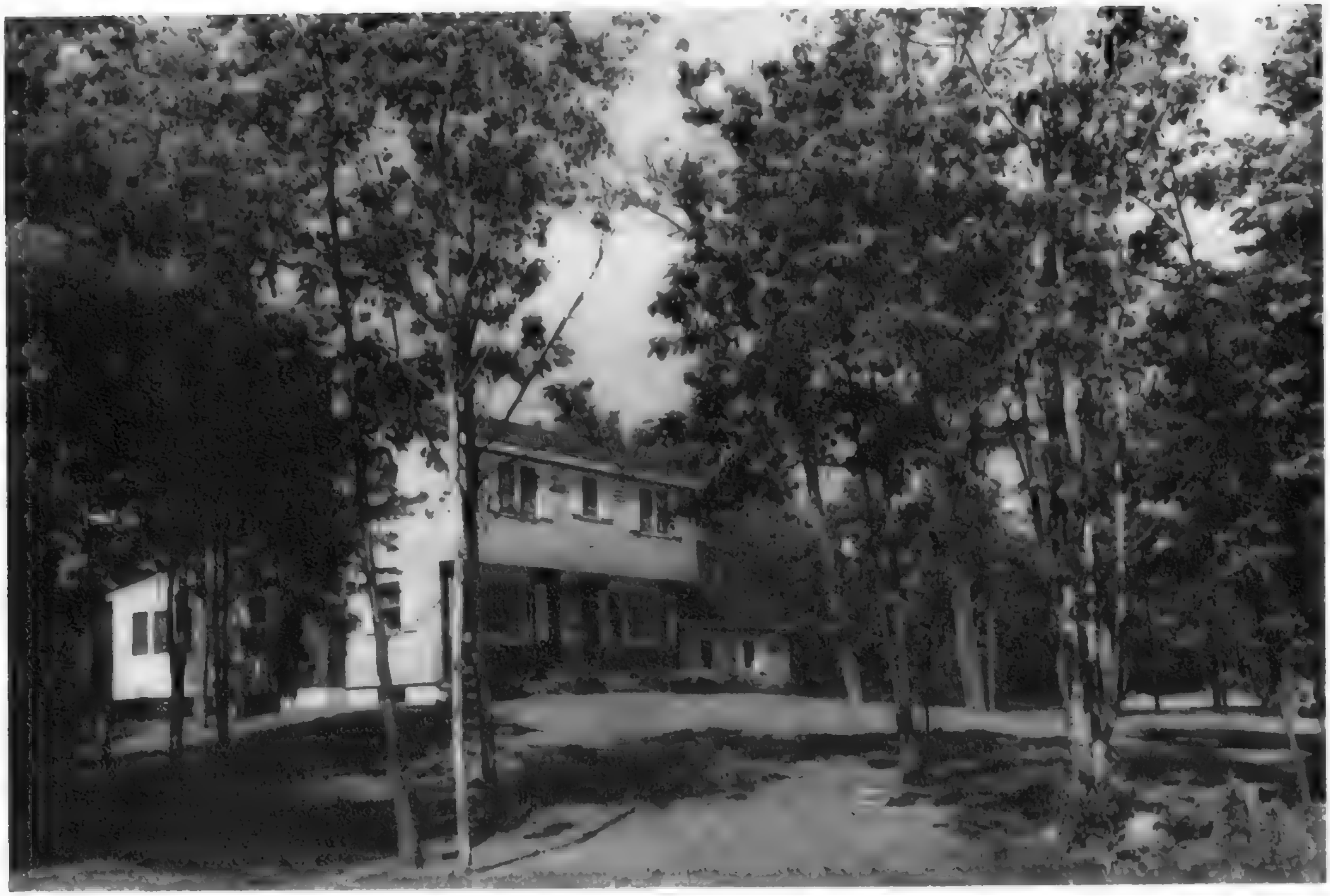

Figure 18.—Well-developed homesite on Charlton soils that have slight limitations for residential development.

the absorptive quality of the soil and the level of the water table during wet seasons. Specific location of filter fields for disposal of effluent requires onsite investigation. The main soil features affecting use for septic tank sewage effluent disposal are permeability of the soil, depth to water table, depth to bedrock or pan layer, steepness of slope, stoniness, and hazard of flooding.

Ratings for lawns and landscaping are based on soil properties that limit the establishment and maintenance of lawns and shrubs. It is assumed that the lawns will be subject to moderate foot traffic and that fill or topsoil is not brought in. The main soil features affecting use for lawns and landscaping are texture of the surface soil and subsoil, depth to water table, depth to bedrock, steepness of slope, stoniness, rockiness, and hazard of flooding.

Streets and parking lots referred to in this table are hard surface and are for use in community subdivisions. The actual layout of streets and parking lots will require onsite investigations. The main soil features affecting this use are depth to water table, steepness of slope, depth to bedrock, rockiness, stoniness, potential frost action, and hazard of flooding.

Sewage lagoons are shallow ponds built to dispose of sewage through the process of oxidation. It is assumed that the natural soil below a depth of about 1½ feet will be used for the reservoir site and as material for construction of embankments (fig. 20). Location of specific sites for sewage lagoons requires onsite investigations. Major soil features affecting this use are permeability of the soil, depth to bedrock, steepness of slope, stoniness, hazard of flooding, and organic-matter content.

Cemeteries referred to are those areas or sites intended for community cemeteries. Consideration was given to those soil properties that influence the establishment and maintenance of grass cover. No importation of fill or topsoil is considered in the ratings. Major soil features affecting use for cemeteries are depth to water table, depth to bedrock or pan layer, steepness of slope, permeability, stoniness, rockiness, texture of surface soil, and hazard of flooding.

Formation, Morphology, and Classification of the Soils [6]

This section is in four parts. In the first part, factors of soil formation are discussed as they relate to the formation of soils in Strafford County. The second part

[6] By Nobel K. Peterson, associate professor, soil and water science, University of New Hampshire.

Figure 19.—**House built in area of Hollis soils where the shallow depth to bedrock is a limitation to excavation of cellars and to septic tank sewage disposal.**

discusses the morphology of the soils in the county. In the third part, the soil series of Strafford County are placed in their respective family, subgroup, and order of the current system of classification and also in their respective great soil group and order of the 1938 classification system. The fourth part consists of laboratory data of selected soils in the county.

Formation of the Soils

Soils are the result of the interaction of five major factors: (1) climate; (2) plant and animal life; (3) parent material; (4) topography; and (5) time. The relative importance of each factor differs from place to place. Normally, a combination of all five factors determines the kind of soil that develops in any given place. In Strafford County, parent material and topography account for most of the differences between the soils.

Climate

The climate of Strafford County is predominantly continental. Average annual temperature is about 47 degrees, and average annual rainfall is about 42 inches. Rainfall during the growing season is fairly uniform, and there is generally 3 inches or more each month. Local variations result mainly from differences in elevation. More detailed information about the climate of the county is given in the section "Climate."

Temperature and rainfall govern the rates of physical and chemical weathering of the soils (*22*). The excessively drained to moderately well drained soils in the county have been leached of readily soluble bases and are acid in reaction. Chemical weathering proceeds at a very slow rate during the winter months (*20*), but physical weathering continues in the form of alternate freezing and thawing. This promotes granulation of soil material and the breaking of rock fragments into smaller units.

Plant and animal life

Plant and animal life is active in the soil-forming process. In Strafford County, however, climate, topography, and parent material have had a greater influence on soil formation. The major influence of plants is through the addition of organic matter.

Strafford County was originally 90 to 95 percent forest. White pine was dominant, but red and white oak, beech,

Figure 20.—**Small sewage lagoon systems constructed in Rumney fine sandy loam. Soil limitations are severe, and the main concern is flooding.**

sugar maple, and hemlock were also common. Hardwoods use much of the bases in the soil, but these bases are returned to the soil in the fallen leaves (*18*). Since the natural fertility of most soils in Strafford County is low, few bases are returned and the soils remain acid even under hardwoods. The acid nature of pine litter helps to lower the base status of the soil.

The nature of the vegetation influences the number and kind of micro-organisms in the soils. Fungi are generally present in much greater number in soil developed under forest than in soil developed under grass. Bacteria, fungi, and other micro-organisms decompose the fresh organic matter and change it to the more resistant humus. Earthworms, rodents, and other animals that live in the soil help mix the soil layers. They also aid aeration and the decomposition of organic matter.

The activities of man have brought about significant changes in soil development. Clearing the forests, constructing buildings and roads, and cultivating, liming, fertilizing, and irrigating the soils are a few of these activities that have mixed the upper soil horizons, accelerated the rate of erosion, or otherwise changed the nature of the soils.

Parent material

The present landscape features and the parent material in the survey area are largely the remains of the last ice advance and retreat during the late Wisconsin stage of glaciation (*6*). The majority of the soils in Strafford County formed in glacial till and glaciofluvial deposits.

The coarse-textured glacial till of the uplands in the northern, central, and western parts of the county reflects the nature of the coarse-grained parent rock. The Gloucester and Acton soils formed in this kind of till. Some of the till is friable to firm, is moderately coarse textured, and is derived largely from fine-grained schist parent rock. The Charlton and Sutton soils formed in this type of glacial till. The Paxton, Woodbridge, and Ridgebury soils also formed in moderately coarse textured till; however, the till is firm to very firm and has accumulated through the process of lodgement or plastering rather than dumping (*6*). A few rounded hills, or drumlins, in the town of Strafford and in the city of Rochester are distinctive landscape features from this type of glacial till deposition.

TABLE 8.—*Estimated soil limitations*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in referring to other series that appear in the first column of this table. Gravel and

Soil series and map symbol	Degree and kind of limitations for— Sites for buildings without basements	Sanitary facilities (seasonal use)	Campsites: Trailer
Acton:			
AcB	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.
AdB	Moderate: stones on the surface.	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.
AdC	Moderate: stones on the surface.	Moderate: seasonal high water table; slope.	Severe: slope
Biddeford: Be	Severe: high water table	Severe: high water table; slow permeability.	Severe: high water table
Buxton: BzA, BzB	Slight	Severe: slow permeability	Moderate: seasonal high water table; slow permeability; slope.
Charlton:			
CfB	Slight	Slight	Moderate: slope
CfC	Slight	Moderate: slope	Severe: slope
CfD	Moderate: slope	Severe: slope	Severe: slope
CsB	Moderate: stones on the surface.	Slight	Moderate: stones on the surface; slope.
CsC	Moderate: stones on the surface.	Moderate: slope	Severe: slope
CsD	Moderate: slope; stones on the surface.	Severe: slope	Severe: slope
CvD	Severe: slope; stones on the surface.	Severe: slope; stones on the surface.	Severe: slope; stones on the surface.
Deerfield:			
DeA	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table.
DeB	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.
Elmwood: EaA, EaB	Slight	Severe: moderately slow permeability.	Moderate: seasonal high water table; moderately slow permeability; slope.
Fresh water marsh: Fa	Severe: ponded	Severe: ponded	Severe: ponded
Gloucester:			
GlB	Slight	Slight	Moderate: slope
GlC	Slight	Moderate: slope	Severe: slope
GsB	Moderate: stones on the surface.	Slight	Moderate: stones on the surface; slope.
GsC	Moderate: stones on the surface.	Moderate: slope	Severe: slope
GsD	Moderate: slope; stones on the surface.	Severe: slope	Severe: slope
GsE, GtD, GtE	Severe: slope; stones on the surface.	Severe: slope; stones on the surface.	Severe: slope; stones on the surface.
Hinckley:			
HaA	Slight	Slight [1]	Moderate: droughty
HaB	Slight	Slight [1]	Moderate: droughty; slope.
HaC	Slight	Moderate: [1] slope	Severe: slope
HbE	Severe: [2] slope	Severe: [1] slope	Severe: slope

for recreational development

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for borrow pits (Gv) and Made land (Ma) were not included because they are too variable]

Degree and kind of limitations for—Continued				
Campsites—Continued	Play areas		Roads and parking areas (unpaved)	Vegetative cover (grass)
Tent	Athletic fields	Parks and picnic areas		
Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Slight.	Moderate: seasonal high water table.	Slight.
Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Slight.	Moderate: seasonal high water table.	Moderate: stones on the surface.
Moderate: seasonal high water table; slope.	Severe: slope.	Moderate: slope.	Moderate: seasonal high water table; slope.	Moderate: stones on the surface.
Severe: high water table.	Severe: high water table; slow permeability.	Severe: high water table.	Severe: high water table; high potential frost action.	Severe: high water table.
Moderate: seasonal high water table; slow permeability.	Moderate: seasonal high water table; slope.	Slight.	Moderate: seasonal high water table; high potential frost action.	Slight.
Slight.	Moderate: slope.	Slight.	Slight.	Slight.
Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Slight.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Moderate: stones on the surface.	Moderate: slope; stones on the surface.	Slight.	Slight.	Moderate: stones on the surface.
Moderate: stones on the surface; slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Moderate: stones on the surface.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: stones on the surface; slope.
Severe: slope; stones on the surface.	Severe: slope; stones on the surface.	Severe: slope; stones on the surface.	Severe: slope; stones on the surface.	Severe: stones on the surface.
Moderate: seasonal high water table.	Moderate: seasonal high water table.	Slight.	Moderate: seasonal high water table.	Slight.
Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Slight.	Moderate: seasonal high water table.	Slight.
Moderate: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table; slope.	Slight.	Moderate: seasonal high water table; medium to high potential frost action.	Slight.
Severe: ponded.	Severe: ponded.	Severe: ponded.	Severe: ponded.	Severe: ponded.
Slight.	Moderate: slope.	Slight.	Slight.	Slight.
Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Slight.
Moderate: stones on the surface.	Moderate: slope; stones on the surface.	Slight.	Slight.	Moderate: stones on the surface.
Moderate: slope; stones on the surface.	Severe: slope.	Moderate: slope.	Moderate: slope.	Moderate: stones on the surface.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: stones on the surface; slope.
Severe: slope; stones on the surface.	Severe: slope; stones on the surface.	Severe: slope; stones on the surface.	Severe: slope; stones on the surface.	Severe: slope; stones on the surface.
Moderate: droughty.	Moderate: droughty.	Moderate: droughty.	Slight.	Severe: droughty.
Moderate: droughty.	Moderate: droughty; slope.	Moderate: droughty.	Slight.	Severe: droughty.
Moderate: droughty; slope.	Severe: slope.	Moderate: droughty; slope.	Moderate: slope.	Severe: droughty.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty; slope.

TABLE 8.—*Estimated soil limitations*

Soil series and map symbol	Degree and kind of limitations for—		
	Sites for buildings without basements	Sanitary facilities (seasonal use)	Campsites — Trailer
*Hollis:			
HcB, HfB	Slight	Severe: bedrock at depth of 20 inches or less.	Moderate: slope
HcC, HfC	Slight	Severe: bedrock at depth of 20 inches or less.	Severe: slope
HcD	Moderate: slope	Severe: bedrock at depth of 20 inches or less; slope.	Severe: slope
HdB, HgB	Moderate: bedrock outcrops.	Severe: bedrock at depth of 20 inches or less; bedrock outcrops.	Moderate: bedrock outcrops; slope.
HdC, HgC	Moderate: bedrock outcrops.	Severe: bedrock at depth of 20 inches or less; bedrock outcrops.	Severe: slope
HdD, HgD	Moderate: bedrock outcrops; slope.	Severe: bedrock at depth of 20 inches or less; bedrock outcrops; slope.	Severe: slope
HeD, HeE, HlD, HlE	Severe: bedrock outcrops; slope.	Severe: bedrock at depth of 20 inches or less; bedrock outcrops; slope.	Severe: bedrock outcrops; slope.
For Charlton part of HcB, HcC, HcD, HdB, HdC, HdD, HeD, and HeE, see units CfB, CfC, CfD, CsB, CsC, CsD, and CvD in the Charlton series; for the Gloucester part of HfB, HfC, HgB, HgC, HgD, HlD, and HlE, see units GlB, GlC, GsB, GsC, GsD, GtD, and GtE in the Gloucester series.			
*Leicester:			
LcB	Severe: high water table	Severe: high water table	Severe: high water table
LeA, LeB, LrA, LrB. For the Ridgebury part of LrA and LrB, see RlA and RlB in the Ridgebury series.	Severe: high water table	Severe: high water table	Severe: high water table
Mixed alluvial land, wet: Ml	Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding
Muck and peat: Mp	Severe: high water table	Severe: high water table	Severe: high water table
Ondawa: On	Severe: occasional flooding.	Severe: occasional flooding.	Severe: occasional flooding.
Paxton:			
PbB	Slight	Severe: moderately slow permeability.	Moderate: moderately slow permeability; slope.
PbC	Slight	Severe: moderately slow permeability.	Severe: slope
PbD	Moderate: slope	Severe: moderately slow permeability; slope.	Severe: slope
PdB	Moderate: stones on the surface.	Severe: moderately slow permeability.	Moderate: stones on the surface; moderately slow permeability; slope.
PdC	Moderate: stones on the surface.	Severe: moderately slow permeability.	Severe: slope
PdD	Moderate: slope; stones on the surface.	Severe: moderately slow permeability; slope.	Severe: slope
PdE	Severe: slope	Severe: moderately slow permeability; slope.	Severe: slope

for recreational development—Continued

Degree and kind of limitations for—Continued				
Campsites—Continued	Play areas		Roads and parking areas (unpaved)	Vegetative cover (grass)
Tent	Athletic fields	Parks and picnic areas		
Slight	Moderate: bedrock at depth of 20 inches or less; slope.	Slight	Moderate: bedrock at depth of 20 inches or less.	Slight.
Moderate: slope	Severe: slope	Moderate: slope	Moderate: bedrock at depth of 20 inches or less; slope.	Slight.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Moderate: bedrock outcrops.	Severe: bedrock outcrops.	Moderate: bedrock outcrops.	Severe: bedrock outcrops.	Moderate: bedrock outcrops.
Moderate: bedrock outcrops; slope.	Severe: bedrock outcrops; slope.	Moderate: bedrock outcrops; slope.	Severe: bedrock outcrops.	Moderate: bedrock outcrops.
Severe: slope	Severe: bedrock outcrops; slope.	Severe: slope	Severe: bedrock outcrops; slope.	Moderate: bedrock outcrops; slope.
Severe: bedrock outcrops; slope.	Severe: bedrock outcrops; slope.	Severe: bedrock outcrops; slope.	Severe: bedrock outcrops; slope.	Severe: bedrock outcrops; slope.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Moderate: high water table.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table; stones on the surface
Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.	Severe: frequent flooding.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Severe: occasional flooding.	Severe: occasional flooding.	Moderate: occasional flooding.	Severe: occasional flooding.	Slight.
Moderate: moderately slow permeability.	Moderate: moderately slow permeability; slope.	Slight	Moderate: medium to high potential frost action.	Slight.
Moderate: moderately slow permeability; slope.	Severe: slope	Moderate: slope	Moderate: medium to high potential frost action:; slope.	Slight.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Moderate: stones on the surface; moderately slow permeability.	Moderate: stones on the surface; moderately slow permeability; slope.	Slight	Moderate: medium to high potential frost action.	Moderate: stones on the surface.
Moderate: stones on the surface; moderately slow permeability; slope.	Severe: slope	Moderate: slope	Moderate: medium to high potential frost action; slope.	Moderate: stones on the surface.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Moderate: stones on the surface; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 8.—*Estimated soil limitation*

Soil series and map symbol	Degree and kind of limitations for— Sites for buildings without basements	Sanitary facilities (seasonal use)	Campsites: Trailer
Podunk: Po	Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding
Ridgebury:			
RgA, RgB	Severe: high water table	Severe: high water table; moderately slow permeability.	Severe: high water table
RlA, RlB	Severe: high water table	Severe: high water table; moderately slow permeability.	Severe: high water table
Rock outcrop: Ro	Severe: bedrock outcrops	Severe: bedrock outcrops	Severe: bedrock outcrops
Rumney: Ru	Severe: high water table; frequent flooding.	Severe: high water table; frequent flooding.	Severe: high water table; frequent flooding.
Saugatuck: Sb	Severe: high water table	Severe: high water table	Severe: high water table
Scantic: ScA, ScB	Severe: high water table	Severe: high water table; slow permeability.	Severe: high water table
Suffield:			
SfC	Slight	Severe: slow permeability	Severe: slope
SfE	Severe: [2] slope	Severe: slow permeability; slope.	Severe: slope
Suncook: Sk	Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding
Sutton:			
SnB	Slight	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.
SuB	Moderate: stones on the surface.	Moderate: seasonal high water table.	Moderate: seasonal high water table; slope; stones on the surface.
Swanton: SwA, SwB	Severe: high water table	Severe: high water table; slow permeability.	Severe: high water table
Tidal marsh: Ta	Severe: tidal flooding	Severe: tidal flooding	Severe: tidal flooding
Whitman: Wa	Severe: high water table	Severe: high water table; moderately slow permeability.	Severe: high water table
Windsor:			
WdA	Slight	Slight [1]	Moderate: droughty
WdB	Slight	Slight [1]	Moderate: droughty; slope.
WdC	Slight	Moderate: [1] slope	Severe: slope
WdE	Severe: [2] slope	Severe: [1] slope	Severe: slope
Windsor, clay subsoil variant:			
WfB	Slight	Severe: moderately slow permeability.	Moderate: slope
WfC	Slight	Severe: moderately slow permeability.	Severe: slope

for recreational development —Continued

Degree and kind of limitations for—Continued				
Campsites—Continued	Play areas		Roads and parking areas (unpaved)	Vegetative cover (grass)
Tent	Athletic fields	Parks and picnic areas		
Severe: frequent flooding.	Severe: frequent flooding.	Moderate: frequent flooding.	Severe: frequent flooding.	Slight.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Moderate: high water table.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table; stones on the surface.
Severe: bedrock outcrops.	Severe: bedrock outcrops.	Severe: bedrock outcrops.	Severe: bedrock outcrops.	Severe:[3] bedrock outcrops.
Severe: high water table; frequent flooding.	Severe: high water table; frequent flooding.	Severe: high water table; frequent flooding.	Severe: high water table; frequent flooding.	Moderate: high water table.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Moderate: high water table.
Severe: high water table.	Severe: high water table; slow permeability.	Severe: high water table.	Severe: high water table; high potential frost action.	Severe: high water table.
Moderate: slope; slow permeability.	Severe: slope.	Moderate: slope.	Moderate: high potential frost action; slope.	Slight.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe:[2] slope.
Severe: frequent flooding.	Severe: frequent flooding.	Moderate: frequent flooding.	Severe: frequent flooding.	Severe: droughty.
Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Slight.	Moderate: seasonal high water table.	Slight.
Moderate: seasonal high water table; stones on the surface.	Moderate: seasonal high water table; slope; stones on the surface.	Slight.	Moderate: seasonal high water table.	Moderate: stones on the surface.
Severe: high water table.	Severe: high water table; slow permeability.	Severe: high water table.	Severe: high water table; high potential frost action.	Severe: high water table.
Severe: tidal flooding.	Severe: tidal flooding.	Severe: tidal flooding.	Severe: tidal flooding.	Severe: tidal flooding.
Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.	Severe: high water table.
Moderate: droughty.	Moderate: droughty.	Moderate: droughty.	Slight.	Severe: droughty.
Moderate: droughty.	Moderate: droughty; slope.	Moderate: droughty.	Slight.	Severe: droughty.
Moderate: droughty; slope.	Severe: slope.	Moderate: droughty; slope.	Moderate: slope.	Severe: droughty.
Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty; slope.
Slight.	Moderate: slope.	Slight.	Moderate: medium potential frost action.	Slight.
Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: medium potential frost action; slope.	Slight.

TABLE 8.—*Estimated soil limitations*

Soil series and map symbol	Degree and kind of limitations for—		
	Sites for buildings without basements	Sanitary facilities (seasonal use)	Campsites: Trailer
Woodbridge:			
WgB	Slight	Severe: moderately slow permeability.	Moderate: seasonal high water table; slope.
WsB	Moderate: stones on the surface.	Severe: moderately slow permeability.	Moderate: seasonal high water table; slope; stones on the surface.
WsC	Moderate: stones on the surface.	Severe: moderately slow permeability.	Severe: slope

[1] Possible pollution hazard to nearby lakes, streams, springs, or wells.
[2] Rating is moderate for slopes of less than 25 percent.

TABLE 9.—*Estimated soil limitations*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils for referring to other series that appear in the first column of this table. Gravel and borrow

Soil series and map symbols	Degree and kind of limitation for—	
	Homesite foundations (3 stories or less)	Septic tank sewage effluent disposal (year-round use)
Acton:		
AcB	Moderate: seasonal high water table	Severe: seasonal high water table
AdB	Moderate: seasonal high water table	Severe: seasonal high water table
AdC	Moderate: seasonal high water table; slope	Severe: seasonal high water table
Biddeford: Be	Severe: high water table	Severe: high water table; slow permeability.
Buxton:		
BzA	Moderate: seasonal high water table	Severe: seasonal high water table; slow permeability.
BzB	Moderate: seasonal high water table	Severe: seasonal high water table; slow permeability.
Charlton:		
CfB	Slight	Slight
CfC	Moderate: slope	Moderate: slope
CfD	Severe: slope	Severe: slope
CsB	Moderate: stones on the surface	Slight
CsC	Moderate: stones on the surface; slope	Moderate: slope
CsD	Severe: slope	Severe: slope
CvD	Severe: stones on the surface; slope	Severe: stones on the surface; slope
Deerfield: DeA, DeB	Moderate: seasonal high water table	Severe: seasonal high water table

for recreational development—Continued

Degree and kind of limitations for—Continued				
Campsites—Continued	Play areas		Roads and parking areas (unpaved)	Vegetative cover (grass)
Tent	Athletic fields	Parks and picnic areas		
Moderate: seasonal high water table.	Moderate: seasonal high water table; slope.	Slight	Moderate: seasonal high water table; medium to high potential frost action.	Slight.
Moderate: seasonal high water table; stones on the surface.	Moderate: seasonal high water table; stones on the surface; slope.	Slight	Moderate: seasonal high water table; medium to high potential frost action.	Moderate: stones on the surface.
Moderate: seasonal high water table; stones on the surface; slope.	Severe: slope	Moderate: slope	Moderate: seasonal high water table; medium to high potential frost action; slope.	Moderate: stones on the surface.

[3] Rock outcrop may have scenic value.

for community development

in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions pits (Gv) and Made land (Ma) were not included, because they are too variable to be rated]

Degree and kind of limitation for—Continued			
Lawns and landscaping	Streets and parking lots (paved)	Sewage lagoons	Cemeteries
Slight	Moderate: seasonal high water table; slope.	Severe: moderately rapid permeability.	Moderate: seasonal high water table.
Moderate: stones on the surface.	Moderate: seasonal high water table; slope.	Severe: moderately rapid permeability.	Severe: stones on the surface.
Moderate: stones on the surface; slope.	Severe: slope	Severe: moderately rapid permeability; slope.	Severe: stones on the surface.
Severe: high water table	Severe: high water table, high potential frost action.	Moderate: fair to poor compaction characteristics.	Severe: high water table.
Slight	Severe: high potential frost action.	Slight	Moderate: seasonal high water table.
Slight	Severe: high potential frost action.	Moderate: slope	Moderate: seasonal high water table.
Slight	Moderate:[1] slope	Moderate: moderate permeability; slope.	Slight.
Moderate: slope	Severe: slope	Severe: slope	Moderate: slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: stones on the surface	Moderate:[1] slope	Moderate: moderate permeability; slope.	Severe: stones on the surface.
Moderate: stones on the surface; slope.	Severe: slope	Severe: slope	Severe: stones on the surface.
Severe: slope	Severe: slope	Severe: slope	Severe: stones on the surface; slope.
Severe: stones on the surface; slope.	Severe: stones on the surface; slope.	Severe: stones on the surface; slope.	Severe: stones on the surface; slope.
Severe: sandy surface layer	Moderate: seasonal high water table; slope.	Severe: moderately rapid permeability.	Moderate: seasonal high water table.

TABLE 9.—*Estimated soil limitations*

Soil series and map symbols	Degree and kind of limitation for—	
	Homesite foundations (3 stories or less)	Septic tank sewage effluent disposal (year-round use)
Elmwood: EaA, EaB	Moderate: seasonal high water table	Severe: seasonal high water table; moderately slow permeability.
Fresh water marsh: Fa	Severe: ponded	Severe: ponded
Gloucester:		
GlB	Slight	Slight
GlC	Moderate: slope	Moderate: slope
GsB	Moderate: stones on the surface	Slight
GsC	Moderate: stones on the surface; slope	Moderate: slope
GsD, GsE	Severe: slope	Severe: slope
GtD, GtE	Severe: stones on the surface; slope	Severe: stones on the surface; slope
Hinckley:		
HaA	Slight	Slight: [2]
HaB	Slight	Slight: [2]
HaC	Moderate: slope	Moderate: [2] slope
HbE	Severe: slope	Severe: [2] slope
*Hollis:		
HcB, HcC, HfB, HfC	Severe: bedrock at depth of 20 inches or less.	Severe: bedrock at depth of 20 inches or less.
HcD	Severe: bedrock at depth of 20 inches or less; slope.	Severe: bedrock at depth of 20 inches or less; slope.
HdB, HdC, HdD, HeD, HeE, HgB, HgC, HgD, HlD, HlE. (For the Charlton part of units HcB, HcC, HcD, HdB, HdC, HdD, HeD, and HeE, see units CfB, CfC, CfD, CsB, CsC, CsD, and CvD in the Charlton series. For Gloucester part of units HfB, HfC, HgB, HgC, HgD, HlD, and HlE, see units GlB, GlC, GsB, GsC, GsD, GtD, and GtE in the Gloucester series.)	Severe: bedrock at depth of 20 inches or less; bedrock outcrops; slope.	Severe: bedrock at depth of 20 inches or less; bedrock outcrops; slope.
Leicester: LcB, LeA, LeB, LrA, LrB. For the Ridgebury part of LrA and LrB, see RlA and RlB in the Ridgebury series.	Severe: high water table	Severe: high water table
Mixed alluvial land, wet: Ml	Severe: high water table; frequent flooding.	Severe: high water table; frequent flooding.
Muck and peat: Mp	Severe: high water table; poor stability; high compressibility.	Severe: high water table
Ondawa: On	Severe: occasional flooding	Severe: occasional flooding

for community development—Continued

Degree and kind of limitation for—Continued			
Lawns and landscaping	Streets and parking lots (paved)	Sewage lagoons	Cemeteries
Slight	Severe: medium to high potential frost action.	Moderate:[1] slope	Moderate: seasonal high water table.
Severe: ponded	Severe: ponded	Severe: ponded	Severe: ponded.
Moderate: somewhat droughty.	Moderate:[1] slope	Severe: moderately rapid permeability.	Slight.
Moderate: somewhat droughty; slope.	Severe: slope	Severe: moderately rapid permeability; slope.	Moderate: slope.
Moderate: somewhat droughty; stones on the surface.	Moderate:[1] slope	Severe: moderately rapid permeability.	Severe: stones on the surface.
Moderate: somewhat droughty; stones on the surface; slope.	Severe: slope	Severe: moderately rapid permeability; slope.	Severe: stones on the surface.
Severe: slope	Severe: slope	Severe: moderately rapid permeability; slope.	Severe: stones on the surface; slope.
Severe: stones on the surface; slope.	Severe: stones on the surface; slope.	Severe: moderately rapid permeability; slope.	Severe: stones on the surface; slope.
Severe: droughty	Slight	Severe: rapid permeability	Severe: droughty.
Severe: droughty	Moderate: slope	Severe: rapid permeability	Severe: droughty.
Severe: droughty	Severe: slope	Severe: rapid permeability; slope.	Severe: droughty.
Severe: droughty; slope	Severe: slope	Severe: rapid permeability; slope.	Severe: droughty; slope.
Moderate: bedrock at depth of 20 inches or less.	Severe: bedrock at depth of 20 inches or less; slope.	Severe: bedrock at depth of 20 inches or less; slope.	Severe: bedrock at depth of 20 inches or less.
Severe: slope	Severe: bedrock at depth of 20 inches or less; slope.	Severe: bedrock at depth of 20 inches or less; slope.	Severe: bedrock at depth of 20 inches or less.
Severe: bedrock outcrops	Severe: bedrock at depth of 20 inches or less; bedrock outcrops; slope.	Severe: bedrock at depth of 20 inches or less; slope.	Severe: bedrock at depth of 20 inches or less; bedrock outcrops; slope.
Severe: high water table	Severe: high water table	Severe: moderately rapid permeability.	Severe: high water table.
Severe: high water table; frequent flooding.	Severe: high water table; frequent flooding.	Severe: frequent flooding	Severe: high water table; frequent flooding.
Severe: high water table	Severe: high water table	Severe: high organic-matter content; ponded; poor stability.	Severe: high water table.
Severe: occasional flooding	Severe: occasional flooding	Severe: occasional flooding	Severe: occasional flooding.

TABLE 9.—*Estimated soil limitations*

Soil series and map symbols	Degree and kind of limitation for—	
	Homesite foundations (3 stories or less)	Septic tank sewage effluent disposal (year-round use)
Paxton:		
PbB	Moderate: perched water table above pan layer.	Severe: moderately slow permeability
PbC	Moderate: perched water table above pan layer; slope.	Severe: moderately slow permeability
PbD	Severe: slope	Severe: moderately slow permeability; slope.
PdB	Moderate: perched water table above pan layer; stones on the surface.	Severe: moderately slow permeability
PdC	Moderate: perched water table above pan layer; stones on the surface; slope.	Severe: moderately slow permeability
PdD, PdE	Severe: slope	Severe: moderately slow permeability; slope.
Podunk: Po	Severe: frequent flooding	Severe: seasonal high water table; frequent flooding.
Ridgebury: RgA, RgB, RlA, RlB	Severe: high water table	Severe: high water table; moderately slow permeability.
Rock outcrop: Ro	Severe: bedrock exposures	Severe: bedrock exposures
Rumney: Ru	Severe: high water table; frequent flooding.	Severe: high water table; frequent flooding.
Saugatuck: Sb	Severe: high water table	Severe: high water table
Scantic: ScA, ScB	Severe: high water table	Severe: high water table; slow permeability.
Suffield:		
SfC	Moderate: slope	Severe: slow permeability
SfE	Severe: slope	Severe: slow permeability; slope
Suncook: Sk	Severe: frequent flooding	Severe: frequent flooding
Sutton:		
SnB	Moderate: seasonal high water table	Severe: seasonal high water table
SuB	Moderate: seasonal high water table	Severe: seasonal high water table
Swanton: SwA, SwB	Severe: high water table	Severe: high water table; slow permeability.
Tidal marsh: Ta	Severe: tidal flooding	Severe: tidal flooding
Whitman: Wa	Severe: high water table	Severe: high water table; moderately slow permeability.
Windsor:		
WdA	Slight	Slight [2]
WdB	Slight	Slight [2]
WdC	Moderate: slope	Moderate: [2] slope
WdE	Severe: slope	Severe: [2] slope

for community development—Continued

Degree and kind of limitation for—Continued			
Lawns and landscaping	Streets and parking lots (paved)	Sewage lagoons	Cemeteries
Slight	Moderate: slope; medium to high potential frost action.	Moderate: possible leakage at reservoir site; slope.	Moderate: moderately slow permeability.
Moderate: slope	Severe: slope	Severe: slope	Moderate: moderately slow permeability; slope.
Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: stones on the surface.	Moderate: slope; medium to high potential frost action.	Moderate: possible leakage at reservoir site; slope.	Severe: stones on the surface.
Moderate: stones on the surface; slope.	Severe: slope	Severe: slope	Severe: stones on the surface.
Severe: slope	Severe: slope	Severe: slope	Severe: stones on the surface; slope.
Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding	Severe: frequent flooding.
Severe: high water table	Severe: high water table	Moderate: [1] slope	Severe: high water table.
Severe: bedrock exposures	Severe: bedrock exposures	Severe: bedrock exposures	Severe: bedrock exposures.
Severe: high water table; frequent flooding.	Severe: high water table; frequent flooding.	Severe: frequent flooding	Severe: high water table; frequent flooding.
Severe: high water table	Severe: high water table	Severe: rapid permeability in substratum.	Severe: high water table.
Severe: high water table	Severe: high water table; high potential frost action.	Moderate: fair to poor compaction characteristics; slope.	Severe: high water table.
Moderate: slope	Severe: high potential frost action; slope.	Severe: slope	Moderate: slow permeability; slope.
Severe: slope	Severe: high potential frost action; slope.	Severe: slope	Severe: slope.
Severe: frequent flooding	Severe: frequent flooding	Severe: rapid permeability; frequent flooding.	Severe: frequent flooding.
Slight	Moderate: seasonal high water table; slope.	Moderate: moderate permeability; slope.	Moderate: seasonal high water table.
Moderate: stones on the surface	Moderate: seasonal high water table; slope.	Moderate: moderate permeability; slope.	Severe: stones on the surface.
Severe: high water table	Severe: high water table; high potential frost action.	Moderate: [1] slope	Severe: high water table.
Severe: tidal flooding	Severe: tidal flooding	Severe: tidal flooding	Severe: tidal flooding.
Severe: high water table	Severe: high water table	Moderate: ponding	Severe: high water table.
Severe: droughty	Slight	Severe: rapid permeability	Severe: droughty.
Severe: droughty	Moderate: slope	Severe: rapid permeability	Severe: droughty.
Severe: droughty	Severe: slope	Severe: rapid permeability; slope.	Severe: droughty.
Severe: droughty; slope	Severe: slope	Severe: rapid permeability; slope.	Severe: droughty; slope.

TABLE 9.—*Estimated soil limitations*

Soil series and map symbols	Degree and kind of limitation for—	
	Homesite foundations (3 stories or less)	Septic tank sewage effluent disposal (year-round use)
Windsor, clay subsoil variant:		
WfB	Slight	Severe: moderately slow permeability
WfC	Moderate: slope	Severe: moderately slow permeability
Woodbridge:		
WgB	Moderate: seasonal high water table	Severe: seasonal high water table; moderately slow permeability.
WsB	Moderate: seasonal high water table	Severe: seasonal high water table; moderately slow permeability.
WsC	Moderate: seasonal high water table; slope	Severe: seasonal high water table; moderately slow permeability.

[1] Rating is slight for all slopes of less than 3 percent.
[2] Possible hazard of pollution to nearby lakes, streams, springs, or wells.

Glaciofluvial deposits accumulated when water from the melting ice picked up the smaller particles and carried them to varying distances (*8*). The material was sorted according to grain size, and outwash plains and terraces were formed of bedded sands and gravel. A few glaciofluvial deposits, differing greatly in grain size, are in the form of kames and eskers. The Hinckley soils formed in bedded sands and gravel on outwash plains, terraces, kames, and eskers. The Windsor, Deerfield, and Saugatuck soils formed in sands on plains and terraces.

About 5 percent of the soils in Strafford County formed in marine deposits, mostly silts and clays. These occur in the southeastern part of the county at elevations generally below 200 feet. The principal soils are in the Suffield, Buxton, Scantic, and Biddeford series. The Elmwood and Swanton soils are also in this area, but they formed in loamy soil material over silts and clays. A few soils in the county are forming in alluvial sediments deposited by present day streams. The Suncook, Ondawa, Podunk, and Rumney soils are forming in this alluvium.

Because much of the glacial material was transported only a short distance, the underlying rock formations play an important part in the distribution of the parent material from which the soils have formed (*14*). Granite, quartz monzonite, granodiorite, quartzite, and coarse-grained mica schist underlie about 75 percent of the county. Generally, this includes that part of the county north of the town of Barrington. The remaining areas south and east of Barrington are mostly underlain with phyllites, slates, and schists. A band of diorite and gran odiorite underlies most of the soils in the towns of Durham and Madbury (*3*). The relatively complex geologic pattern caused by a further mixing of these materials by overdrag from glacial movement gives a complex pattern of parent material.

Organic soils are forming in deposits of muck and peat in formerly ponded depressions where plant remains have accumulated over a long period of time. Organic deposits in Strafford County are classified as a land type, Muck and peat.

Topography

Topography affects surface drainage and has considerable influence on soil formation. The county is nearly level along the seaboard and is gently rolling to steep in the uplands in the northwest. Average elevation is 100 feet; the range is from sea level to 1,760 feet on Copple Crown Mountain in New Durham. Most of the steep soils are in the northwestern range of mountains and in a second range located south and southwest of Farmington. The dominant relief on the uplands is gently rolling or sloping to hilly. The valleys in the hilly area are narrow, and stream flow is rapid. In the lowland of the southern and southeastern parts of the county, stream flow is slower due in part to the level relief.

The influence of topography on the soils is evident from a comparison of the profiles of soils that developed from the same parent material and under the same climatic conditions, but which were different in topography and drainage conditions. The Paxton, Woodbridge, Ridgebury, and Whitman soils formed in firm, compact, platy glacial till. The Paxton soils are well drained, have a fragipan at a depth of about 2 feet, and are mostly sloping. The slope is not steep enough to cause excessive erosion and not level enough to prevent runoff. The Woodbridge soils are moderately well drained and have a fragipan in the subsoil. Because they are mostly gently sloping, runoff is medium to slow and more surface water enters the soil. The nearly level to gently sloping Ridgebury soils occupy depressions, are poorly drained, and have a fragipan in the subsoil. The Whitman soils are very poorly drained. They receive runoff from adjoining slopes but have little runoff because of their nearly level topography.

for community development—Continued

Degree and kind of limitation for—Continued			
Lawns and landscaping	Streets and parking lots (paved)	Sewage lagoons	Cemeteries
Slight	Moderate: medium potential frost action; slope.	Moderate: slope	Moderate: moderately slow permeability.
Moderate: slope	Severe: slope	Severe: slope	Moderate: moderately slow permeability; slope.
Slight	Moderate: slope; seasonal high water table; medium to high potential frost action.	Moderate: possible leakage at reservoir site; slope.	Moderate: seasonal high water table.
Moderate: stones on the surface.	Moderate: slope; seasonal high water table; medium to high potential frost action.	Moderate: possible leakage at reservoir site; slope.	Severe: stones on the surface.
Moderate: stones on the surface.	Severe: slope	Severe: slope	Severe: stones on the surface.

In table 10 the soil series are arranged to show relationship between parent material, topographic position, and drainage classification.

Time

Time is an important factor in soil formation. Generally, the soils in Strafford County have been developing since the last ice sheet receded approximately 14,000 years ago (*9*). Whether or not a mature profile develops in a soil in this length of time is determined by all the major factors of soil formation. If the soil is steep, and the geologic erosion rate is rapid, the soil will be immature. Some alluvial soils, such as those of the Suncook series, are immature because of the continual accumulation of sediments.

The Gloucester soils are mature soils. They have been in place long enough to have distinct horizons. The rate of weathering of these soils exceeds the rate of geologic erosion. The Ondawa soils are forming in alluvial sediments on flood plains. They are somewhat immature because the deposition of fresh alluvium prevents the formation of distinct horizons.

Morphology of the Soils

Most soils in Strafford County have distinct horizons. Such soils as those of the Suncook, Ondawa, Podunk, and Rumney series, which are forming in alluvium, are the exceptions.

Distinct soil horizons are the result of soil profile development in the cool, humid northeastern part of the United States. The reasons for differences in these horizons are many. In Strafford County the principal reasons are (1) addition of organic matter, (2) transformation and transfer of organic matter and iron and aluminum oxides, (3) chemical weathering of primary minerals or rocks and parent material into silicate clays, and (4) chemical change and transfer of iron. One or more of these processes have acted on most of the soils in the county, but the degree of activity differs from soil to soil.

Organic matter has accumulated in all the soils in Strafford County to form an A1 or Ap horizon. Where the soils have been plowed and cultivated, the A1 horizon has been changed to an Ap horizon and in some places part or all of the A horizon has been removed by erosion. The amount of organic matter added to the soils depends on the vegetation, aspect, temperature, moisture, and drainage conditions. The Suncook and Windsor soils have very small amounts of organic matter in the A horizon; the Biddeford and Whitman soils are high in organic-matter content.

The process most important in the formation of horizons in the soils of Strafford County involves the movement of organic matter and iron and aluminum oxides out of the A horizon and into the B horizon. This process is called podzolization. Under acid conditions the decomposition of organic matter in the A horizon dissolves sesquioxides (iron and alumninum oxides), reduces iron, and forms soluble metal-organic complexes (*17*). These complexes move out of the A horizon and into the B horizon, where they are precipitated under conditions of oxidation. The intensity of this soil-forming process determines the degree of podzolization. A thin, faint, leached A2 horizon may form over an accumulation of humus and sesquioxides in the B horizon. In places the A2 horizon is absent. The Acton, Charlton, Deerfield, Elmwood, Gloucester, Hinckley, Hollis, Paxton, Suffield, Sutton, Windsor, and Woodbridge soils all show evidence of the podzolization process. This podzolization process is strongly expressed in the Saugatuck soils, but the movement of organic matter and iron and aluminum oxides is associated with a fluctuating water table.

In soils that are not well drained, the reduction of ferric iron to the ferrous form results in a change in soil color. An example is a change in the color of the soil from yellowish brown to various shades of gray. This process is known as gleization (*20*). In some cases the

TABLE 10.—*Soil series arranged to show relationship between position, parent material, and drainage*

Parent Material	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Poorly drained	Very poorly drained
SOILS ON BOTTOM LANDS						
Coarse textured and moderately coarse textured alluvial sediments of mixed mineralogy.	Suncook		Ondawa	Podunk	Rumney.[1]	
SOILS ON OUTWASH PLAINS AND TERRACES						
Stratified sand and gravel deposits, mainly from granite, gneiss, and schist.	Hinckley					
Sand deposits containing little or no gravel, mainly from granite, gneiss, and schist.	Windsor			Deerfield	Saugatuck.[1]	
SOILS ON MARINE OR LACUSTRINE TERRACES						
Silt and clay deposits			Suffield	Buxton[2]	Scantic	Biddeford.
Loamy material from 18 to 40 inches thick over silt and clay deposits.				Elmwood	Swanton.[1]	
SOILS ON UPLANDS						
Coarse-textured glacial till, mainly from coarse-grained rock.		Gloucester		Acton		
Moderately coarse textured glacial till, mainly from medium-grained and fine-grained rock.		Hollis[3]	Charlton	Sutton	Leicester.[1]	
Moderately coarse textured, compact glacial till, mainly from medium-grained and fine-grained rock.			Paxton	Woodbridge	Ridgebury[1]	Whitman.

[1] Extends into the lower range of the somewhat poorly drained class.

[2] Extends into the upper range of the somewhat poorly drained class.

[3] Shallow to bedrock.

reduced iron is removed entirely from the profile; in others, the iron moves to a different horizon and is partly reoxidized. Mottles in the soil result from this reoxidation. Gley layers are common in the poorly drained to very poorly drained soils, such as those of the Biddeford, Leicester, Ridgebury, Scantic, Swanton, and Whitman series.

Some soils, such as those of the Paxton series, have a distinct fragipan. It is believed that the pan did not form during the current cycle of soil development, but that it formed through the process of lodgement or plastering (*6*). The eluvial-illuvial sequence is not apparent or is weakly expressed.

Classification of the Soils

Soils are placed in narrowly defined classes so we can identify them and apply knowledge of them to the management of small areas, such as farms, towns, and counties. They are placed in broadly defined categories so that large areas, such as countries or continents, can be studied and compared. Further explanations concerning narrowly defined classes of soils are in the section "How This Survey Was Made."

The soil classification system described in this section is the current system, which was adopted for general use by the National Cooperative Soil Survey in 1965 (*23*). The previous system, adopted in 1938 and later revised (*19*, *20*), was incomplete and did not properly emphasize the observable and measurable characteristics of the soil. Modifications are being made to the new system as more knowledge is gained (*15*).

In a few cases the classification of the soils has changed in Strafford County since the soils were classified and correlated in 1968. Therefore, the reader interested in the current classification should search the latest literature available.

Under the current system of classification, all soils are placed in six categories. Beginning with the most inclusive category, they are: order, suborder, great group, subgroup, family, and series. Table 11 shows the soil series of Strafford County classified in the current system by the order, subgroup, and family. It also gives the great soil group and order of the 1938 classification.

A description of each soil series in the county, including a representative profile of the series, is in the section "Descriptions of the Soils." A brief description of each of the six classification categories in the current system is given in the following paragraphs.

Order.—Ten soil orders are recognized. Each order is named with a word of three or four syllables ending in *sol.* They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate soil orders are those that tend to give broad climatic groupings of soils. The exceptions to this are the Entisols, Histosols, and to some extent the Inceptisols. These three orders occur in many different climates.

Table 11 shows the three soil orders in Strafford County: Entisols, Inceptisols, and Spodosols. Entisols are "recent" soils. They do not have genetic horizons, or they have only the beginnings of such horizons. The Suncook series is an example of this order.

Inceptisols are soils that have begun to develop characteristic properties in the various horizons. The Leicester series is an example of this order.

Spodosols are soils that have a distinctive horizon called a spodic horizon. In the Spodosols of Strafford County, this diagnostic subsurface horizon consists of an illuvial accumulation of free sesquioxides and organic carbon. The Charlton and Gloucester series are representative of this order.

Suborder.—Each order is divided into suborders, primarily on the basis of those soil characteristics that seem to produce classes with the greatest genetic similarity. Suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders mainly reflect the presence or absence of waterlogging or the soil differences resulting from the climate or vegetation. The names of suborders have two syllables. An example is *orth* (the true or common ones) coupled with *od* from Spodosols to form the *Orthods* suborders. Suborders are not shown in table 11.

Great group.—Suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons on which the divisions are based are those in which clay, iron, or humus have accumulated. The features used are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Haplorthods: *Hapl* meaning simple, *orth* for true, and *od* from Spodosols. Great groups in the current system are not shown in table 11.

Subgroup.—Great groups are divided into subgroups. One subgroup of the great group represents the central (typic) segment of the group; the others, called intergrades, have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of

TABLE 11.—*Classification of soils*

Series	Current system			1938 system	
	Family	Subgroup	Order	Great soil group	Order
Acton	Sandy-skeletal, mixed, mesic	Aquentic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Biddeford	Fine, illitic, nonacid, mesic	Histic Humaquepts	Inceptisols	Humic Gley soils	Intrazonal.
Buxton	Fine, mixed, mesic	Aquic Dystric Eutrochrepts.[1]	Inceptisols [1]	Brown Podzolic soils	Zonal.
Charlton	Coarse-loamy, mixed, mesic	Entic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Deerfield	Sandy, mixed, mesic	Aquentic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Elmwood	Coarse-loamy over clayey, mixed, mesic.	Aquentic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Gloucester	Sandy-skeletal, mixed, mesic	Entic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Hinckley	Sandy-skeletal, mixed, mesic	Entic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Hollis	Loamy, mixed, mesic	Entic Lithic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Leicester	Coarse-loamy, mixed, acid, mesic	Typic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Ondawa	Coarse-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils	Azonal.
Paxton	Coarse-loamy, mixed, mesic	Entic Fragiorthods	Spodosols	Brown Podzolic soils	Zonal.
Podunk	Coarse-loamy, mixed, mesic	Aquic Fluventic Dystrochrepts.	Inceptisols	Alluvial soils	Azonal.
Ridgebury	Coarse-loamy, mixed, mesic	Aeric Fragiaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Rumney	Coarse-loamy, mixed, acid, mesic	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Saugatuck	Sandy, mixed, mesic, ortstein	Aeric Haplaquods	Spodosols	Ground-Water Podzols	Intrazonal.
Scantic	Fine, illitic, nonacid, mesic	Typic Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Suffield	Coarse-silty over clayey, mixed, mesic.	Entic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Suncook	Mixed, mesic	Typic Udipsamments	Entisols	Alluvial soils	Azonal.
Sutton	Coarse-loamy, mixed, mesic	Aquentic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Swanton	Coarse-loamy over clayey, mixed, nonacid, mesic.	Aeric Haplaquepts	Inceptisols	Low-Humic Gley soils	Intrazonal.
Whitman	Coarse-loamy, mixed, mesic	Typic Fragiaquepts	Inceptisols	Humic Gley soils	Intrazonal.
Windsor	Sandy, mixed, mesic	Entic Haplorthods	Spodosols	Brown Podzolic soils	Zonal.
Woodbridge	Coarse-loamy, mixed, mesic	Aquentic Fragiorthods	Spodosols	Brown Podzolic soils	Zonal.

[1] The Buxton soils in Strafford County are taxadjuncts to the series because they have a B2 horizon that qualifies as a spodic horizon

the subgroups are derived by placing one or more adjectives before the name of the great group. An example is Entic Haplorthod (a simple true spodosol integrated to Entisol because of minimum development of the diagnostic subsurface horizon).

Family.—Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or behavior of soils when manipulated by man. Among the properties considered in Strafford County are texture, mineralogy, reaction, and soil temperature. A family name consists of a series of adjectives preceding the subgroup name. An example is the coarse-loamy, mixed, mesic family of Entic Haplorthods.

Series.—The series is a group of soils that have major horizons that are similar in important characteristics and in arrangement in the profile except for texture of the surface layer. They are given the name of a geographic location near the place where that series was first observed and mapped. An example is the Charlton series.

Laboratory Data

The physical and chemical properties of two selected soils in Strafford County are shown in tables 12 and 13. The pedons from which the samples were collected adequately represent those of their respective series. The laboratory analyses were made at the Soil Survey Laboratory of the Soil Conservation Service at Beltsville, Maryland, and at the University of New Hampshire. In addition, Soil Survey Investigation Report No. 20, dated August 1968, contains laboratory data and profile descriptions for two soils of the Woodbridge series (samples S56NH-9-2 and S56NH-9-3) that were sampled in Strafford County. These data will be helpful in characterizing and classifying the soils and in understanding their genesis. The information will also be useful in determining proper land use and management.

The bulk soil samples were air-dried and crushed with a rolling pin so that the material could pass through a 2-millimeter sieve. All determinations except those for bulk density and water content at 1/3 atmosphere were made on a fine-earth fraction of less than 2 millimeters. A soil sample was ground to approximately 0.25 millimeter for the determination of organic carbon and total nitrogen.

Particle size was determined by the pipette method with dispersion by sodium hexametaphosphate and by mechanical shaking using the method of Kilmer and Alexander (*10*).

The moisture retained at a tension of 1/3 and 15 bars was determined with pressure plate and pressure membrane apparatus, respectively. The moisture retained at a tension of 1/3 bar was determined on clods for the soil horizons of Scantic silt loam; it was determined on small core samples for the soil horizons of Windsor loamy sand.

Bulk density, expressed in grams per cubic centimeter, was determined by the use of saran-coated clods for the soil horizons of Scantic silt loam; it was determined by small core samples for the soil horizons of Windsor loamy sand.

TABLE 12.—*Physical properties*

[Dashes in column indicate that the sample

Soil and sample number	Horizon	Depth from surface	Particle-size distribution [1]—			
			Very coarse sand (1 to 2 mm.)	Coarse sand (0.5 to 1 mm.)	Medium sand (0.25 to 0.5 mm.)	Fine sand (0.10 to 0.25 mm.)
		Inches	*Percent*	*Percent*	*Percent*	*Percent*
Scantic silt loam: S64NH-9-1-(1-9)	Ap	0-9	0.9	2.7	3.2	5.7
	A2g	9-13	3.8	7.4	7.1	10.9
	B21g	13-15	9.9	14.0	9.3	13.8
	IIB22g	15-21	.1	.4	.5	.8
	IIB23g	21-25	.1	.2	.3	.9
	IIB31g	25-35	.6	1.3	1.1	2.8
	IIB32g	35-48	.2	.3	.3	.9
	IIC1g	48-63	.1	.4	.4	1.1
	IIC2g	63-72	[3]	.2	.4	.6
Windsor loamy sand: S64NH-9-4-(1-7)	Ap	0-6	2.0	21.0	32.8	22.8
	B21	6-10	2.0	25.7	36.0	16.0
	B22	10-16	1.3	28.4	39.9	15.8
	B3	16-25	.4	19.0	47.9	27.6
	C1	25-33	.2	12.5	52.4	30.5
	C2	33-48	.2	6.1	41.8	43.3
	C3	48-55	.3	11.2	26.4	36.7
	C4	55-68	.6	9.3	37.0	47.9

[1] Determined by the Soil Survey Laboratory at Beltsville, Maryland.
[2] Determination of Scantic silt loam is for clods (tests by Soil Survey Laboratory at Beltsville, Maryland); determination of Windsor loamy sand is for cores (tests by the University of New Hampshire).

The pH of the soil samples was measured by glass electrode using a soil-water ratio of 1:1.

A modified Walkey-Black method was used for determination of organic carbon (*11*). Total nitrogen was determined by a Kjeldahl procedure.

A sodium dithionite-citrate method was used for extractable iron determination.

Cation exchange capacity was calculated from the sum of extractable bases and extractable acidity (*11*).

Some of the results of the analyses of the soils in tables 12 and 13 are discussed in the following pages. The information obtained in the laboratory can be used to verify field observations. The results of the physical tests are used to evaluate the engineering properties of the soils, the response of the soils to cultivation, and the capacity of the soils to absorb, transmit, and store moisture for use by plants.

The base saturation and cation exchange capacity data indicate the degree of leaching of the soils and the ability of the soils to hold and to supply plant nutrients. The pH and extractable acidity tests are helpful in determining the amount of liming needed. Extractable cation data provide a basis for estimating the fertility of the soil.

For the profiles described, the names of the colors and the color symbols are for moist soils unless stated otherwise.

The profile description of the Windsor soil that was sampled is given in the section "Descriptions of the Soils." The following is the profile description of the Scantic soil from which samples were collected.

Scantic silt loam; S64NH-9-1(1-9).—A profile on a slope of about 1 percent in an abandoned hayfield one-half mile north of Garrison Hill and one-half mile east of New Hampshire Route 16, city of Dover in Strafford County:

Ap—0 to 9 inches, very dark gray (10YR 3/1) silt loam; fine and medium, moderate, granular structure; friable; many fine roots; pH 5.8; abrupt, wavy boundary.

A2g—9 to 13 inches, light-gray (5Y 6/1) very fine sandy loam; moderate, thin, platy structure; slightly hard; common roots; pH 6.1; abrupt, wavy boundary.

B21g—13 to 15 inches, dark-gray (5Y 4/1) sandy loam; many, fine, distinct, yellowish-red (5YR 4/6 and 5/6) mottles; moderate, medium, granular structure; friable; few roots; 10 to 15 percent fine gravel; pH 6.0; abrupt, smooth boundary.

IIB22g—15 to 21 inches, gray (5YR 5/1) silty clay; many fine, distinct, yellowish-red (5Y 5/6) mottles; strong, fine, blocky structure; firm; few roots; pH 6.2; clear, wavy boundary.

IIB23g—21 to 25 inches, gray (5Y 5/1) and light olive-brown (2.5Y 5/4) silty clay; many, fine, distinct, strong-brown (7.5YR 5/6) mottles; strong, medium, prismatic structure; firm; common roots; clay or silt films along old root channels; pH 6.6; gradual, wavy boundary.

IIB31g—25 to 35 inches, olive (5Y 5/3) ped interiors and gray (5Y 5/1) ped exteriors; silty clay; few, fine, distinct, strong-brown (7.5YR 5/6) mottles; strong, coarse, prismatic structure; firm; root channels along prism faces; few, fine, dark-brown (10YR 4/3) manganeselike stains on ped faces; pH 6.6; gradual, wavy boundary.

IIB32g—35 to 48 inches, olive (5Y 5/3) ped interiors and gray (5Y 5/1) ped exteriors; silty clay; few, fine, distinct, strong-brown (7.5YR 5/6) mottles; strong, coarse, prismatic structure parting to moderate,

of selected soils

was not taken or test was not run]

Particle-size distribution [1]—Continued				Textural class	Moisture held at tension of —		Bulk density	
Very fine sand (0.05 to 0.10 mm.)	Silt (0.002 to 0.05 mm.)	Clay ($<$0.002 mm.)	Coarse fragments (2 mm. to 76 mm.)		⅓ bar [2]	15 bars	Oven-dry [2]	⅓ atmosphere of tension [1]
Percent	*Percent*	*Percent*	*Percentage by weight*		*Percent*	*Percent*	*Gm./cc.*	*Gm./cc.*
15.9	52.4	19.2	6	Silt loam	23.6	[1] 11.5	1.34	1.29
19.7	44.3	6.8	0	Loam to sandy loam	10.0	2.3	1.80	1.80
7.8	24.0	21.2	17	Sandy clay loam	------	------	------	------
3.9	43.5	50.8	0	Silty clay	24.5	18.7	1.66	1.52
3.5	44.7	50.3	0	Silty clay	25.9	18.6	1.65	1.51
6.7	51.4	36.1	0	Silty clay loam	21.1	13.6	1.68	1.63
4.0	58.6	35.7	0	Silty clay loam	23.6	13.6	1.65	1.60
2.6	58.2	37.2	0	Silty clay loam	25.8	14.4	1.60	1.55
3.3	63.2	32.3	0	Silty clay loam	25.1	12.4	1.62	1.57
6.3	11.2	3.9	1	Loamy sand	15.7	[4] 3.8	1.19	------
4.5	11.9	3.9	2	Loamy sand	21.2	4.6	1.05	------
3.1	7.3	4.2	2	Sand	8.7	3.1	1.18	------
2.4	.2	2.5	([3])	Sand	3.4	1.2	1.28	------
2.8	.1	1.5	([3])	Sand	2.8	.8	1.42	------
7.0	.3	1.3	([3])	Sand	2.8	.8	1.37	------
13.4	7.6	4.4	([3])	Sand	10.0	1.9	1.34	------
3.6	.3	1.3	([3])	Sand	2.7	.7	1.30	------

[3] Trace.
[4] Determined by the University of New Hampshire.

TABLE 13.—*Chemical properties of selected soils*

[Dashes in columns indicate that sample was not taken or material was not present]

Soil and sample number	Horizon	Depth from surface	Reaction (1:1 H_2O)[1]	Organic matter: Organic carbon[1]	Organic matter: Nitrogen[1]	Organic matter: C/N ratio	Extractable iron as Fe[2]	Cation exchange capacity (sum)	Extractable bases[2] (milliequivalents per 100 grams of soil): Ca	Mg	Na	K	Extractable acidity[2]	Base saturation (sum)
		Inches	*pH*	*Percent*	*Percent*		*Percent*	*Meq./100 gm.*					*Meq./100 gm.*	*Percent*
Scantic silt loam: S64NH-9-1-(1-9).	Ap	0–9	5.2	2.46	0.27	9	0.2	32.4	6.5	14.2	0.1	0.2	11.4	65
	A2g	9–13	6.4	.15	.02	8	.2	3.4	1.1	.4	.1	(3)	1.8	47
	B21g	13–15	6.3	.12	.02	6	1.2	9.1	3.4	2.2	.2	.1	3.2	65
	IIB22g	15–21	6.3	.12	.02	6	.6	19.6	8.0	5.9	.5	.3	4.9	75
	IIB23g	21–25	6.7	.11	.02	6	.9	19.3	8.0	6.0	.5	.3	4.5	77
	IIB31g	25–35	6.9	.09	.02	5	.7	12.6	5.2	4.2	.3	.2	2.7	78
	IIB32g	35–48	7.0	.07	.02	4	1.0	11.6	4.7	3.7	.3	.3	2.6	78
	IIC1g	48–63	6.4	.09	.02	5	1.3	11.5	4.6	3.5	.3	.3	2.8	76
	IIC2g	63–72	7.0	.07	.02	4	1.1	9.3	3.8	2.7	.2	.3	2.3	75
Windsor loamy sand: S64NH-9-4-(1-7).	Ap	0–6	5.0	1.52	.11	14	.5	10.7	------	(3)	------	(3)	10.7	(3)
	B21	6–10	5.3	1.06	.09	12	.7	13.7	.2	(3)	------	(3)	13.5	1
	B22	10–16	5.4	.59	.06	10	.4	6.7	------	------	------	(3)	6.7	(3)
	B3	16–25	5.5	.12	.01	12	.2	2.4	------	(3)	------	(3)	2.4	(3)
	C1	25–33	5.5	.06	.01	6	.2	1.5	------	(3)	------	(3)	1.5	(3)
	C2	33–48	5.4	.05	.01	5	.2	1.4	.2	(3)	(3)	(3)	1.2	14
	C3	48–55	5.6	.08	.01	8	.2	2.7	.2	(3)	(3)	.1	2.5	7
	C4	55–68	5.6	.03	.01	3	.2	.8	------	(3)	(3)	(3)	.8	(3)

[1] Determined by the University of New Hampshire.
[2] Determined by the Soil Survey Laboratory at Beltsville, Maryland.
[3] Trace.

medium, blocky; firm; few, fine silt or clay films along root channels; few, fine, dark-brown (10YR 4/3) manganeselike stains on ped faces; pH 6.6; gradual, wavy boundary.

IIC1g—48 to 63 inches, olive (5Y 5/3) ped interiors and gray (5Y 5/1) ped exteriors; silty clay; massive in place and weak, medium, blocky structure when removed; firm; few, fine, old roots and few silt or clay films in fine pores; common, medium, reddish-black (10R 2/1) manganeselike stains; pH 6.6; gradual, wavy boundary.

IIC2g—63 to 72 inches, olive (5Y 5/3) ped interiors and gray (5Y 5/1) ped exteriors; silty clay; very thick platy structure; firm; few silt or clay films in fine pores and along old root channels; pH 6.6.

Scantic silt loam; S64NH-9-1-(1-9).—The particle-size distribution, high base status, and relatively high exchangeable sodium confirm the marine origin of the underlying material. The relatively high total sand content of the A2g and B21g horizons and the 17-percent content of fine gravel in the B21g horizon are probably due to local wash. Although this Scantic profile shows a clay pickup or bulge at a depth of 15 to 25 inches, there is too little evidence of clay illuviation to meet the requirements for an argillic subsurface horizon. However, the data do indicate characteristic properties of a cambic horizon diagnostic of the older Inceptisols.

Windsor loamy sand; S64NH-9-4-(1-7).—This soil is extensively drained and has very low available water capacity because of its high sand content. The cation exchange capacity is highest in the B21 horizon. Since there is little change in the amount of clay as compared with overlying or underlying horizons, the increase apparently reflects the accumulation of humus with a high exchange capacity. The B21 and B22 horizons have enough amorphous material to meet the requirements of a spodic horizon. However, this pedon does not have the 2-percent organic-matter content in the spodic horizon that is necessary to qualify for the typic subgroup of Haplorthods, and placement is in the subgroup Entic Haplorthods.

Climate[7]

Warm summers, cold winters, and ample rainfall are characteristic of the climate of Strafford County. Though the Atlantic Ocean lies only about 10 to 40 miles to the southeast, the climate is predominantly continental. Winds generally bring inland air into the county. Sometimes, however, particularly in winter, coastal storms produce significant weather events such as heavy snowstorms.

The principal weather station in the county is at the University of New Hampshire, Durham. Data from this station for the period 1931–60 appear in tables 14, 15, and 16. During most of this period, the instruments that recorded the data were located in the built-up part of the campus. The data therefore mainly reflect urban conditions. The station now has a more rural location at the edge of the campus, where average temperatures are 1 to 2 degrees lower. Marked differences occur on

[7] This section was prepared by ROBERT E. LAUTZENHEISER, climatologist National Weather Service, U.S. Department of Commerce.

some clear nights. These affect the average dates of freezes in spring and fall by one to two weeks. The data in the tables should therefore be used with caution and appropriate adjustment before applying them to rural planning.

The temperature range is wide from winter to summer and from day to night. Wide variation is also common from day to day. Elevation ranges from that of the tidal waters in the southeastern part of the county to that of a number of peaks, 1,000 to 1,760 feet high, in the extreme northwestern part of the county. Precipitation tends to increase with elevation, and average temperature drops about 1 degree for each 300 feet of increase in elevation. The range in elevation over most of Strafford County has little effect on the general climate. Local topographical features, especially in combination with different kinds of soil, have a large influence on minimum temperatures on clear nights. The average length of the freeze-free season may therefore vary greatly within small distances. This is a factor to be considered in the selection of crops. The climate of Strafford County is generally favorable to the poultry and dairy industries and to the growing of fruits and vegetables.

Over much of the county, 70°F. is the average temperature in July, the warmest month. In the coldest month, January, the average is from 23° to 25° in most urban locations and from 20° to 23° elsewhere. On an average of 12 to 15 days in summer, temperature reaches 90° or higher. Nights are almost always comfortably cool even in the warmest summers.

The degree-day units found in table 14 are one-sided accumulations of daily average temperatures over or under a given base. For example, the heating units are accumulations of all deficits from a base of 65°. When temperatures for a day average 65° or more, no heat is needed, nor does this excess replace any fuel burned on colder days. Therefore, all such warmer days do not count. Resultant accumulations are excellent indicators of fuel usage. Similarly, accumulated excesses of daily temperatures over other base values are useful in estimating maturity dates of crops or in planning the varieties of crops that may be successful in an area. A base of 40° is generally used for such cool-weather crops as peas, and a base of 50° is useful for such crops as corn.

A substantial number of growing degree-days in a given month does not necessarily mean that a crop may be safely planted. There may be risk of freeze. Table 15 shows the dates when freezes of several degrees of severity reach the given levels of probability. At Durham, for example, there is 1 chance in 10 that a 32° F. freeze will occur after June 2. A 32° freeze usually causes serious damage to sensitive plants. Probabilities for more severe freezes, temperatures to 16°, also appear in the table. The length of the freeze-free season averages 120 to 140 days. The longer season applies to the urban and more protected areas; the more exposed and lower areas have the shorter season. Local low frost pockets and boggy areas may experience freezes later in spring and earlier in fall.

Normal annual precipitation over the county is 40 to 45 inches. Totals differ from year to year, but rarely are they less than 75 percent or more than 125 percent of normal. Precipitation is distributed very evenly among the seasons. Roughly half of the annual precipitation is during the growing season. The rainfall provides an ample supply of water for home and industry and for irrigation of crops during the usually short, but fairly common, dry periods in summer.

Snowfall totals differ greatly from year to year, and in a given year the totals may differ markedly from place to place within the county. Totals range mostly from 55 to 75 inches; the highest amounts are at the higher elevations in the northwestern part. At Durham

TABLE 14.—*Frequencies of selected temperature levels and averages of heating degree-days and growing degree-days*

[Durham, New Hampshire; elevation, 70 feet]

Month	Average number of days with—				Accumulated heat units		
	Maximum temperature of—		Minimum temperature of—		Heating	Growing	
	90° F. or higher	32° F. or lower	32° F. or lower	0° F. or lower	Base 65° F.	Base 40° F.	Base 50° F.
					Degree-days	*Degree-days*	*Degree-days*
January	0	12	30	5	1, 255	0	0
February	0	8	27	4	1, 105	0	0
March	0	3	27	1	955	60	0
April	(1)	0	15	0	590	195	45
May	1	0	4	0	275	505	215
June	3	0	(1)	0	85	760	460
July	6	0	0	0	10	950	640
August	4	0	0	0	30	890	580
September	1	0	2	0	165	635	340
October	(1)	0	10	0	445	340	95
November	0	1	20	(1)	745	85	15
December	0	9	28	2	1, 150	0	0
Year	15	33	163	12	6, 810	4, 420	2, 390

[1] Less than one-half day.

TABLE 15.—*Probabilities of freezing temperatures in spring and fall*

[Durham, New Hampshire; elevation, 70 feet]

Probability	Dates for given probability and temperature				
	32° F. or lower	28° F. or lower	24° F. or lower	20° F. or lower	16° F. or lower
Spring:					
1 year in 10 later than	June 2	May 22	May 3	April 20	April 6
2 years in 10 later than	May 27	May 16	April 27	April 14	April 1
5 years in 10 later than	May 17	May 6	April 17	April 4	March 22
8 years in 10 later than	May 7	April 26	April 7	March 25	March 12
Fall:					
1 year in 10 earlier than	September 13	September 23	October 6	October 22	November 4
2 years in 10 earlier than	September 17	September 28	October 12	October 28	November 10
5 years in 10 earlier than	September 25	October 8	October 22	November 7	November 20
8 years in 10 earlier than	October 3	October 18	November 1	November 17	November 30

the average duration of continuous snow cover of 1 inch or more is 59 days. Variations from winter to winter are from as few as 12 days to as many as 103 days. The average maximum depth of snow cover at Durham is 18 inches. An average date for this depth is about February 5. The duration of snow cover increases with distance inland and with elevation to 75 to 100 days in the northwestern part, where average maximum depth reaches 25 to 30 inches. The average date of the maximum depth is slightly later farther inland. Maximum depth in winter at Durham has ranged from 7 to 32 inches. An average of five times per season there are 4 inches or more of snow per day. This has ranged from none to 12 times at Durham. An 8-inch snowfall occurs once on the average but up to three times in one winter. For much of the county, a 10-inch snowfall can be expected about once in a winter. Other snowfall data appear in table 16.

Thunderstorms accompanied with wind and hail are the main cause of damage to crops. These storms occur an average of 20 to 25 times per year. Although possible in any month, most storms occur during the growing season and bring needed rain. Most of them do little damage. Some bring very heavy rain that erodes the soils and injures plants. Hail may fall once or twice a year at a given location, but only seldom are the stones large or numerous enough to cause extensive damage. Damaging winds or rain are caused by hurricanes about once in a 10-year period. Coastal storms, or "northeasters," bring wind and heavy precipitation much more frequently, but these generally do not cause serious damage. Tornadoes are rare in Strafford County and usually are on an extremely small scale. They are only a small threat to any given location in the county, but they need careful watching whenever they are forecasted.

Additional Facts About the County

This section contains information about the settlement and development of Strafford County, about drainage and water supply, farming, transportation and industries, and educational facilities.

Settlement and Development

The first permanent settlement in Strafford County was established at Dover Point in 1623. Rochester was settled in 1728 and Barrington in 1732. By an act of the Colonial Legislature of March 18, 1771, Strafford County was set up as one of the original five counties of the State. At that time it also included the areas of Belknap and Carroll Counties. The three counties were separated in 1840.

Strafford County has a total land area of 240,834 acres. In 1940 the population was 43,553, 76 percent of which lived in urban areas (*14*). In 1960 the population had increased to 59,749; 81 percent of which lived in urban areas. The population of the county was 66,034 in 1966. In the period 1920–66, the population increase was 58.4 percent. The urban population is located in the southern and eastern parts of the county. The west-central and northern sections are sparsely settled. Dover, the county seat, is the largest city and had a population of 19,131 in 1960. The populations of Rochester and Somersworth in 1960 were 15,927 and 8,529, respectively.

Drainage and Water Supply

Most of Strafford County lies within the Piscataqua River drainage basin. The rivers in this drainage area generally flow toward the southeast. The Piscataqua River empties into the Atlantic Ocean at Portsmouth. The drainage in a small section of the northwestern part of the county flows into the Merrimack River drainage basin.

Municipal water supplies are obtained from both ground-water and surface-water sources. Ground-water sources large enough for public or industrial use are commonly obtained from sandy and gravelly ice-contact deposits; however, the water-yielding capacity and quality of water of these deposits vary from place to place. These deposits, therefore, have to be studied individually.

Small but usually reliable supplies of water, commonly enough for household or industrial use, may be obtained from the bedrock in most places in the county (*4*). Records from 508 drilled wells in Strafford County

TABLE 16.—*Temperature and precipitation*

[Durham, New Hampshire; elevation 70 feet]

Month	Temperature					Precipitation						
	Average daily—			Average highest	Average lowest	Average total	One year in 10 will have—		Average snowfall	Days with—		
	Maximum	Minimum	Mean				Less than—	More than—		Snowfall of 1 inch or more	Snow cover of 1 inch or more	Precipitation of 0.10 inch or more
	°F.	*°F.*	*°F.*	*°F.*	*°F.*	*Inches*	*Inches*	*Inches*	*Inches*			
January	34.6	13.9	24.3	53	−10	3.73	1.9	7.3	17.1	5	25	7
February	36.6	14.6	25.6	53	−9	2.93	1.8	4.6	13.6	3	23	6
March	44.7	23.3	34.0	63	2	3.96	1.5	8.6	10.9	3	16	7
April	57.1	33.1	45.1	78	20	3.80	2.1	5.0	2.2	1	1	8
May	69.4	42.7	56.1	88	28	3.32	1.1	5.5	(1)	0	0	7
June	78.1	52.0	65.1	94	37	3.22	1.2	5.8	0	0	0	7
July	83.6	57.2	70.4	95	45	3.50	1.2	6.0	0	0	0	6
August	81.8	55.2	68.5	94	42	3.22	1.0	5.5	0	0	0	6
September	74.1	47.9	61.0	90	30	3.57	1.0	7.4	0	0	0	6
October	63.2	37.9	50.6	81	21	3.17	1.0	5.6	(1)	(2)	0	6
November	50.3	29.4	39.9	69	11	4.17	1.2	6.9	2.7	1	1	7
December	37.2	17.9	27.6	55	−5	3.59	1.1	6.2	9.1	2	14	6
Year	59.3	35.4	47.4	96	−15	42.18	33.3	51.1	55.6	15	80	79

[1] Trace. [2] Less than one-half day.

(locally called artesian wells) showed an average depth of 143 feet and an average yield of 11 gallons per minute (*16*).

Surface-water supplies in ponds and streams are used as a source of water in some towns in the county, but they have to be carefully protected to avoid pollution.

Farming

Farming in Strafford County has changed over the years. The trend has been toward farms larger in size and fewer in number. In 1959 there were 494 farms in the county, but by 1964 there were only 380. The average size of farms increased from 143.7 acres in 1959 to 151.8 acres in 1964.

Dairy products account for 31 percent of the farm income in the county, forest products for 29 percent, and poultry and poultry products for 28 percent.

In 1964 about 23.9 percent of the county, or 57,691 acres, was in farms.

The following data concerning types of farms in the county is from the U.S. Census of Agriculture:

Type	*Number 1959*	*Number 1964*
Field crop	0	2
Vegetable	5	3
Fruit and nut	5	20
Poultry	47	28
Dairy	122	90
Livestock	10	15
General	5	12
Miscellaneous and unclassified	259	210

In 1964, full owners operated 270 of the farms in the county, part owners operated 89, tenants operated 13, and managers operated 8. The average age of farm operators was 52.6 years, and there were 82 operators who were 65 years of age or older.

The acreages of principal crops in 1959 and 1964 according to the U.S. Census of Agriculture were as follows:

Crop	*1959 (Acres)*	*1964 (Acres)*
Corn cut for silage	436	617
Hay crops (total)	13,740	9,934
Alfalfa	615	986
Clover and timothy (alone or mixed)	7,888	5,885
Oats and other small grains cut for hay	101	40
Other hay	4,700	2,774
Grass silage	436	249
Blueberries (tame or wild)	222	322
	Number	*Number*
Apple trees of bearing age	6,872	8,149
Peach trees of bearing age	2,648	211
Pear trees of bearing age	90	123

Hay is the leading crop in the county. Alfalfa, clover, and timothy are the most important plants grown for forage. The production of silage corn has increased in recent years.

Between 1959 and 1964, apple orchards declined in number from 57 to 33. The commercial orchards are located mainly in the central and southern parts of the county. McIntosh, Cortland, and Baldwin are the principal apple varieties grown. Blueberry growing is most important in the northern and central parts of the county, particularly in the towns of Strafford, New Durham, and Milton. Land for blueberry production is being cleared in some areas of these towns.

Transportation and Industries

A good network of State and local roads serves the people of Strafford County. The Spaulding Turnpike connects the county to the populous areas of southern New Hampshire and eastern Massachusetts. State Routes 16 and 125, running north and south, and U.S. Route

202, running east and west, provide dependable transportation by car and truck. The Boston and Maine Railroad runs through the southern and southeastern parts of the county, but only freight service is provided. Passenger service has been discontinued. There is a small private airport at Rochester.

Strafford County is one of the highly industrialized areas in the State. Leading industries in the county are manufacturers of shoes and leather goods and production of electrical equipment, foam rubber products, printing presses, and machine tools. Sand and gravel deposits are also an important source of income. Shopping facilities in Dover, Somersworth, and Rochester attract customers from much of eastern New Hampshire and southwestern Maine.

Educational Facilities

High schools and grade schools are well distributed throughout the county. Some of the high schools serve only one city or town, and others are regional schools that serve several towns in the surrounding area. The University of New Hampshire is located at Durham. Most of the towns have library facilities. Radio stations are located in Dover and Rochester, and educational television is provided by a station on the campus at Durham.

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Glossary

Acidity. See Reaction, soil.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Base saturation. The degree to which material that has base-exchange properties is saturated with exchangeable cations other than hydrogen, expressed as a percentage of the cation-exchange capacity.

Bedding, land. Plowing, grading, or otherwise elevating the surface of a flat field into a series of broad beds, or "lands," so as to leave shallow surface drains between the beds.

Bleicherde. The light-colored, leached A2 horizon of a Podzol or Spodosol.

Boulder (USDA classification). A stone more than 24 inches in diameter.

Catena. A sequence, or "chain," of soils on a landscape, developed from one kind of parent material but having different characteristics because of differences in relief and drainage.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Cobblestone. A rounded or partly rounded stone 3 to 10 inches in diameter.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to the terrace grade.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Eluviation. The movement of material from one place to another within the soil, in either true solution or colloidal suspension. Soil horizons that have lost material through eluviation are said to be eluvial; those that have received material are illuvial.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic matter and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice; the deposits are stratified and occur in the form of kames, eskers, deltas, and outwash plains.

Gleization. The reduction, translocation, and segregation of soil compounds, notably of iron, usually in the lower horizons, as a result of waterlogging with poor aeration and drainage; expressed in the soil by mottled colors dominated by gray. The soil-forming processes leading to the development of a gley soil.

Graded stripcropping. Growing of crops in strips that are graded toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, and covered by grass for protection against erosion; used to conduct surface water away from cropland.

Gravel (USDA classification). Rounded or subrounded fragments of rock up to 3 inches in diameter.

Green-manure crop. A crop grown for the purpose of being turned under in an early stage of maturity, or soon after maturity, for soil improvement.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides)

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Gleyed horizon.—A strongly mottled horizon that occurs in wet soils and is designated by g.

Fragipan horizon.—A compact horizon designated by x.

Illuviation. The accumulation of material in a soil horizon through the deposition of suspended material and organic matter removed from horizons above. In many soils the B horizon is an illuvial horizon because part of its fine clay content has come from the A horizon above.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile, by the underlying layers, and by the height of the water table, either permanent or perched. Terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

Lithologic discontinuity. Changes in lithology from one of the master horizons. Such changes are identified by Roman numerals.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inches) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Orterde. The aggregated, friable, noncemented B or subsurface horizon of Podzol soils. The accumulation of organic matter or organic matter and iron sesquioxides imparts the usual dark-brown or yellowish coloring.

Pan layer. See Fragipan.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Perched water table. See Water Table.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability in this survey are as follows: *slow, moderately slow, moderate, moderately rapid,* and *rapid.*

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Puddled soil. A soil that is dense, massive, and without regular structure because it has been artifically compacted when wet. Commonly, a puddled soil is a clayey soil that has been tilled when wet.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an

alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		pH
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Rippable bedrock. The in-place property of bedrock whereby it can be broken or dislodged to be handled like soil in earth-moving operations.

Runoff (hydraulics). The part of the precipitation upon a drainage area that is discharged from the area in stream channels. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 millimeter to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Sand Plains. Deposits of glacial outwash consisting mostly of sand-sized material.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stone (USDA classification). A rock fragment greater than 10 inches in diameter if rounded, or greater than 15 inches along the longer axis if flat.

Stripcropping. Growing crops in a systematic arrangement of strips that serve as vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone. A seasonal high water table refers to the highest level at which the water stands for a significant period of time during a wet season.

Weathering, soil. The physical and chemical disintegration and decomposition of rocks and minerals.

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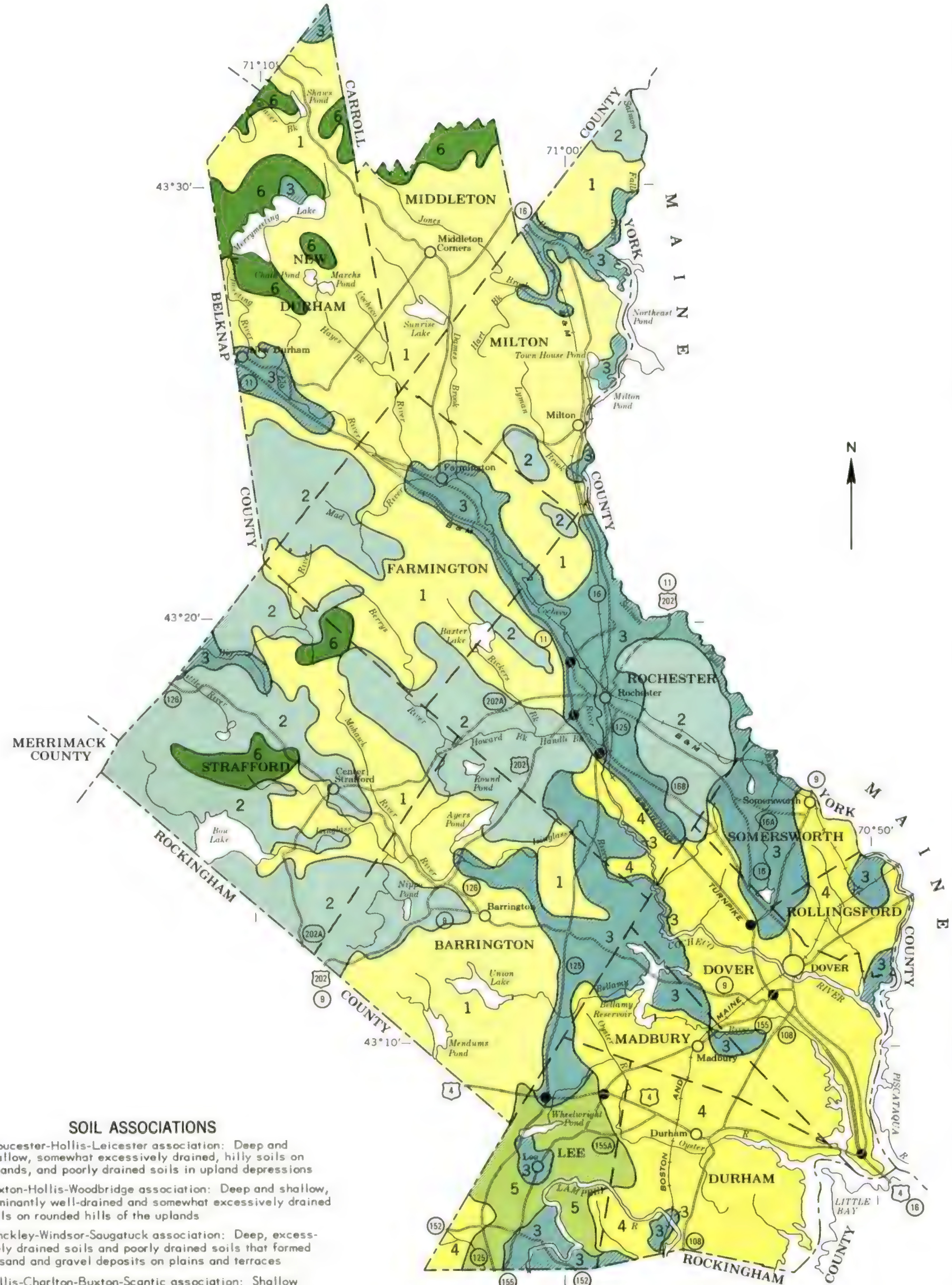

SOIL ASSOCIATIONS

1	Gloucester-Hollis-Leicester association: Deep and shallow, somewhat excessively drained, hilly soils on uplands, and poorly drained soils in upland depressions
2	Paxton-Hollis-Woodbridge association: Deep and shallow, dominantly well-drained and somewhat excessively drained soils on rounded hills of the uplands
3	Hinckley-Windsor-Saugatuck association: Deep, excessively drained soils and poorly drained soils that formed in sand and gravel deposits on plains and terraces
4	Hollis-Charlton-Buxton-Scantic association: Shallow and deep, somewhat excessively drained to well-drained, rolling soils on uplands, and moderately well drained to poorly drained soils that formed in marine deposits of silt and clay
5	Charlton-Hollis-Scantic association: Deep and shallow, well-drained to somewhat excessively drained, rolling soils on uplands, and poorly drained soils that formed in marine deposits of silt and clay
6	Hollis-Gloucester association: Shallow and deep, somewhat excessively drained, rocky and stony soils that occur mostly on low mountains

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SOIL CONSERVATION SERVICE

NEW HAMPSHIRE AGRICULTURAL EXPERIMENT STATION

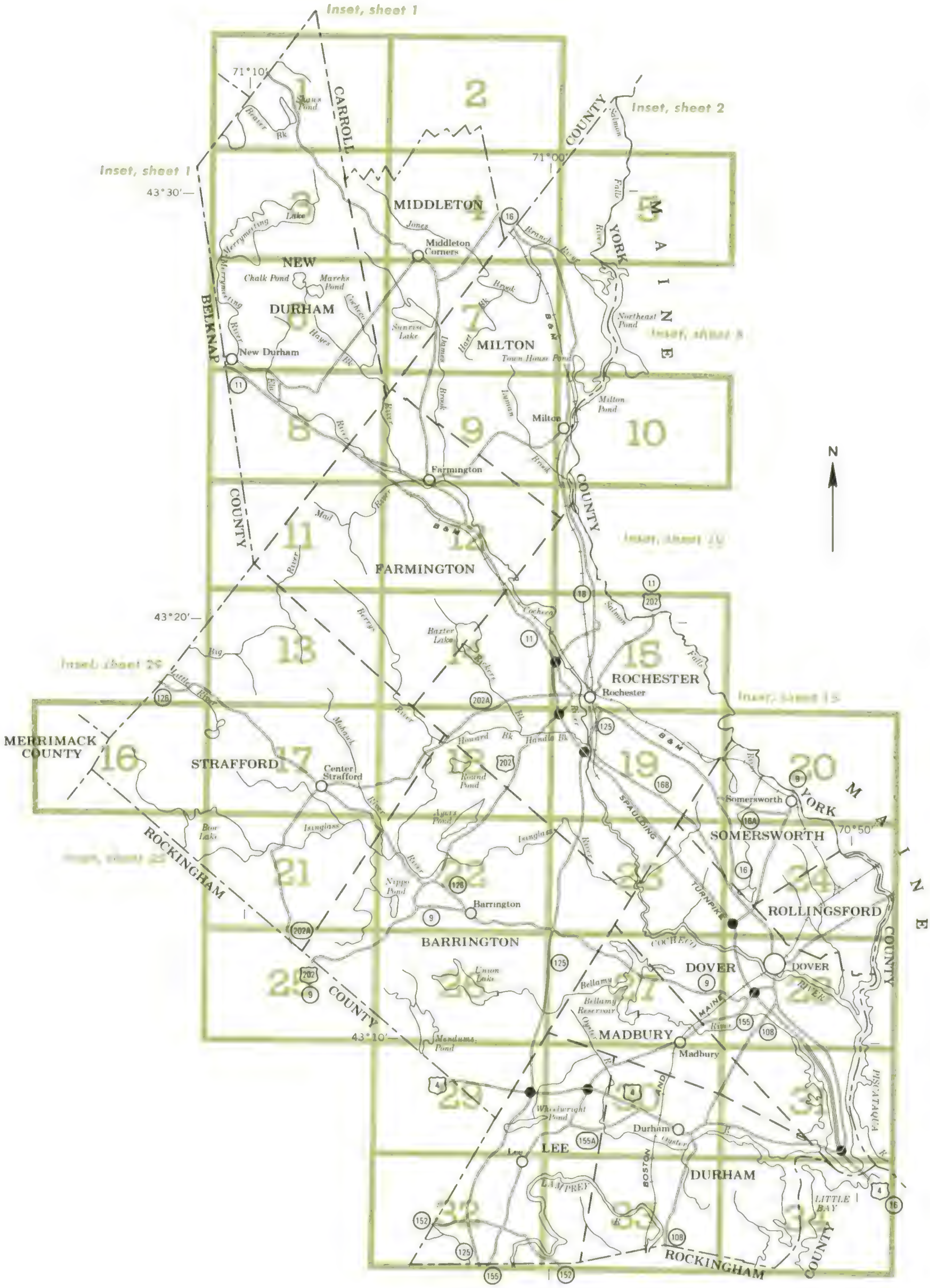
GENERAL SOIL MAP

STRAFFORD COUNTY, NEW HAMPSHIRE

Scale 1:190 080

1 0 1 2 3 4 Miles

This map is for general planning. It shows only the major soils and does not contain sufficient detail for operational planning.



Original text from each individual map sheet read:
This map is one of a set compiled in 1971 as part of a soil survey by the United States Department of Agriculture, Soil Conservation Service, and the New Hampshire Agricultural Experiment Stations.

INDEX TO MAP SHEETS

STRAFFORD COUNTY, NEW HAMPSHIRE

Scale 1:190 080
1 0 1 2 3 4 Miles

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads

- Dual
- Good motor
- Poor motor
- Trail

Highway markers

- National Interstate
- U. S.
- State or county

Railroads

- Single track
- Multiple track
- Abandoned

Bridges and crossings

- Road
- Trail
- Railroad
- Ferry
- Ford
- Grade
- R. R. over
- R. R. under

Tunnel

Buildings

- School
- Church

Mine and quarry

Gravel pit

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Windmill

BOUNDARIES

- National or state
- County
- Minor civil division
- Reservation
- Land grant
- Small park, cemetery, airport

DRAINAGE

Streams, double-line

- Perennial
- Intermittent

Streams, single-line

- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches (CANAL)

Lakes and ponds

- Perennial (water, w)
- Intermittent (int)

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments

- Bedrock
- Other

Prominent peak

Depressions (Large, Small)

- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

- Soil boundary and symbol (Dx)
- Gravel
- Stoniness
  - Stony
  - Very stony
- Rock outcrops
- Chert fragments
- Clay spot
- Sand spot
- Gumbo or scabby spot
- Made land
- Severely eroded spot
- Blowout, wind erosion
- Gully

SOIL LEGEND

The first capital letter is the initial one of the soil name. The second capital letter, A, B, C, D, or E, shows the slope. Most symbols without a slope letter are those of nearly level soils or land types, but some are for land types that have a considerable range in slope.

SYMBOL	NAME
AcB	Acton fine sandy loam, 0 to 8 percent slopes
AdB	Acton very stony fine sandy loam, 0 to 8 percent slopes
AdC	Acton very stony fine sandy loam, 8 to 15 percent slopes
Be	Biddeford silty clay loam
BzA	Buxton silt loam, 0 to 3 percent slopes
BzB	Buxton silt loam, 3 to 8 percent slopes
CfB	Charlton fine sandy loam, 3 to 8 percent slopes
CfC	Charlton fine sandy loam, 8 to 15 percent slopes
CfD	Charlton fine sandy loam, 15 to 25 percent slopes
CsB	Charlton very stony fine sandy loam, 3 to 8 percent slopes
CsC	Charlton very stony fine sandy loam, 8 to 15 percent slopes
CsD	Charlton very stony fine sandy loam, 15 to 25 percent slopes
CvD	Charlton extremely stony fine sandy loam, 8 to 25 percent slopes
DeA	Deerfield loamy sand, 0 to 3 percent slopes
DeB	Deerfield loamy sand, 3 to 8 percent slopes
EoA	Elmwood fine sandy loam, 0 to 3 percent slopes
EoB	Elmwood fine sandy loam, 3 to 8 percent slopes
Fa	Fresh water marsh
GfB	Gloucester fine sandy loam, 3 to 8 percent slopes
GfC	Gloucester fine sandy loam, 8 to 15 percent slopes
GsB	Gloucester very stony fine sandy loam, 3 to 8 percent slopes
GsC	Gloucester very stony fine sandy loam, 8 to 15 percent slopes
GsD	Gloucester very stony fine sandy loam, 15 to 25 percent slopes
GsE	Gloucester very stony fine sandy loam, 25 to 60 percent slopes
GtD	Gloucester extremely stony fine sandy loam, 8 to 25 percent slopes
GtE	Gloucester extremely stony fine sandy loam, 25 to 60 percent slopes
Gv	Gravel and borrow pits
HaA	Hinckley loamy sand, 0 to 3 percent slopes
HaB	Hinckley loamy sand, 3 to 8 percent slopes
HaC	Hinckley loamy sand, 8 to 15 percent slopes
HbE	Hinckley gravelly loamy sand, 15 to 60 percent slopes
HcB	Hollis-Charlton fine sandy loams, 3 to 8 percent slopes
HcC	Hollis-Charlton fine sandy loams, 8 to 15 percent slopes
HcD	Hollis-Charlton fine sandy loams, 15 to 25 percent slopes
HdB	Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes
HdC	Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes
HdD	Hollis-Charlton very rocky fine sandy loams, 15 to 25 percent slopes
HeD	Hollis-Charlton extremely rocky fine sandy loams, 8 to 25 percent slopes
HeE	Hollis-Charlton extremely rocky fine sandy loams, 25 to 60 percent slopes
HfB	Hollis-Gloucester fine sandy loams, 3 to 8 percent slopes
HfC	Hollis-Gloucester fine sandy loams, 8 to 15 percent slopes
HgB	Hollis-Gloucester very rocky fine sandy loams, 3 to 8 percent slopes
HgC	Hollis-Gloucester very rocky fine sandy loams, 8 to 15 percent slopes
HgD	Hollis-Gloucester very rocky fine sandy loams, 15 to 25 percent slopes
HID	Hollis-Gloucester extremely rocky fine sandy loams, 8 to 25 percent slopes
HIE	Hollis-Gloucester extremely rocky fine sandy loams, 25 to 60 percent slopes
LcB	Leicester fine sandy loam, 0 to 8 percent slopes
LeA	Leicester very stony fine sandy loam, 0 to 3 percent slopes
LeB	Leicester very stony fine sandy loam, 3 to 8 percent slopes
LrA	Leicester-Ridgebury very stony fine sandy loams, 0 to 3 percent slopes
LrB	Leicester-Ridgebury very stony fine sandy loams, 3 to 8 percent slopes
Ma	Made land
Ml	Mixed alluvial land, wet
Mp	Muck and peat
On	Ondawa fine sandy loam
PbB	Paxton fine sandy loam, 0 to 8 percent slopes
PbC	Paxton fine sandy loam, 8 to 15 percent slopes
PbD	Paxton fine sandy loam, 15 to 25 percent slopes
PdB	Paxton very stony fine sandy loam, 3 to 8 percent slopes
PdC	Paxton very stony fine sandy loam, 8 to 15 percent slopes
PdD	Paxton very stony fine sandy loam, 15 to 25 percent slopes
PdE	Paxton very stony fine sandy loam, 25 to 60 percent slopes
Po	Podunk fine sandy loam
RgA	Ridgebury fine sandy loam, 0 to 3 percent slopes
RgB	Ridgebury fine sandy loam, 3 to 8 percent slopes
RIA	Ridgebury very stony fine sandy loam, 0 to 3 percent slopes
RIB	Ridgebury very stony fine sandy loam, 3 to 8 percent slopes
Ro	Rock outcrop
Ru	Rumney fine sandy loam
Sb	Saugatuck loamy sand
ScA	Scantic silt loam, 0 to 3 percent slopes
ScB	Scantic silt loam, 3 to 8 percent slopes
SfC	Suffield silt loam, 8 to 15 percent slopes
SfE	Suffield silt loam, 15 to 35 percent slopes
Sk	Suncook loamy sand
SnB	Sutton fine sandy loam, 0 to 8 percent slopes
SuB	Sutton very stony fine sandy loam, 0 to 8 percent slopes
SwA	Swanton fine sandy loam, 0 to 3 percent slopes
SwB	Swanton fine sandy loam, 3 to 8 percent slopes
Ta	Tidal marsh
Wa	Whitman very stony fine sandy loam
WdA	Windsor loamy sand, 0 to 3 percent slopes
WdB	Windsor loamy sand, 3 to 8 percent slopes
WdC	Windsor loamy sand, 8 to 15 percent slopes
WdE	Windsor loamy sand, 15 to 60 percent slopes
WfB	Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes
WfC	Windsor loamy fine sand, clay subsoil variant, 8 to 15 percent slopes
WgB	Woodbridge fine sandy loam, 0 to 8 percent slopes
WsB	Woodbridge very stony fine sandy loam, 0 to 8 percent slopes
WsC	Woodbridge very stony fine sandy loam, 8 to 15 percent slopes

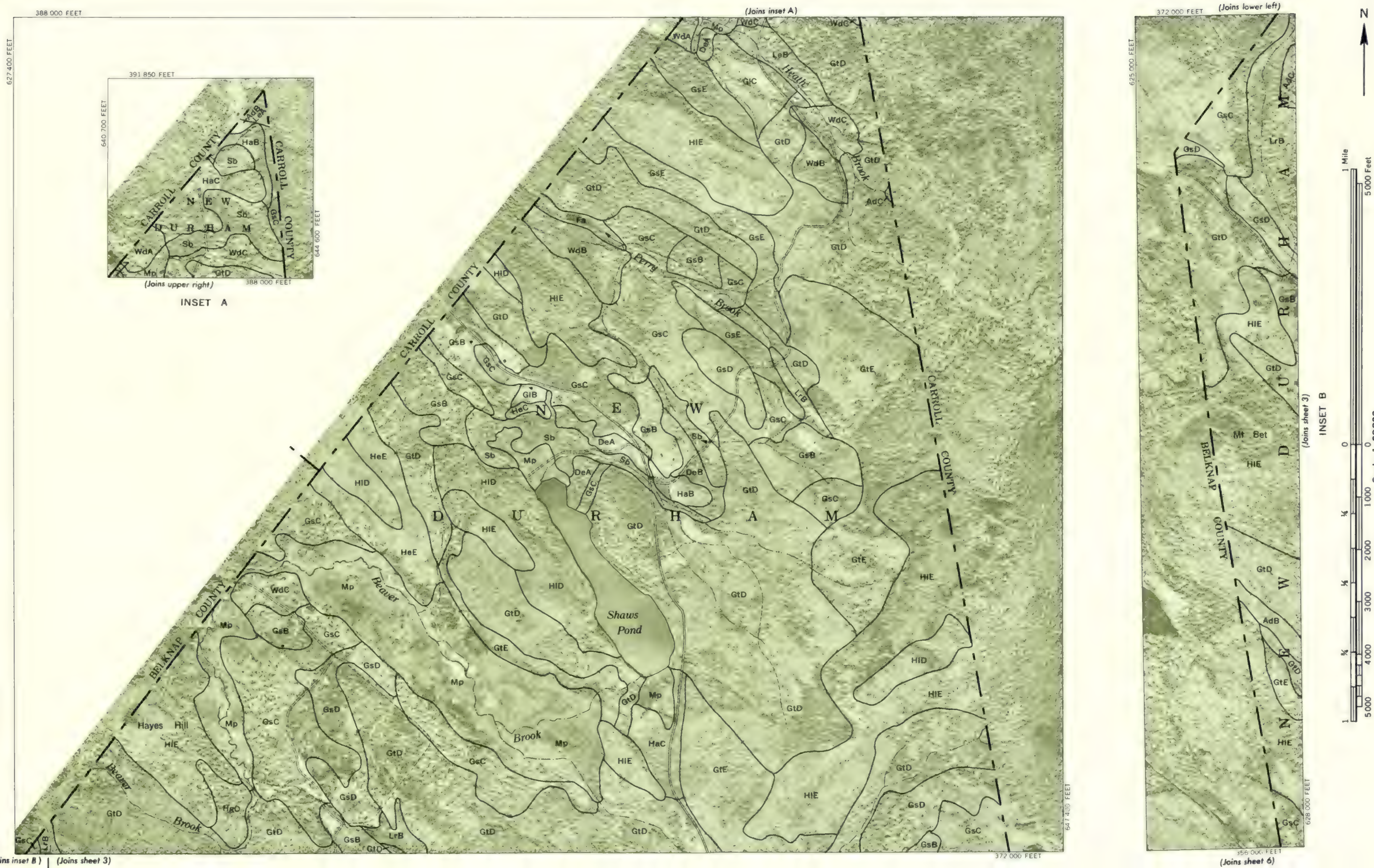
GUIDE TO MAPPING UNITS

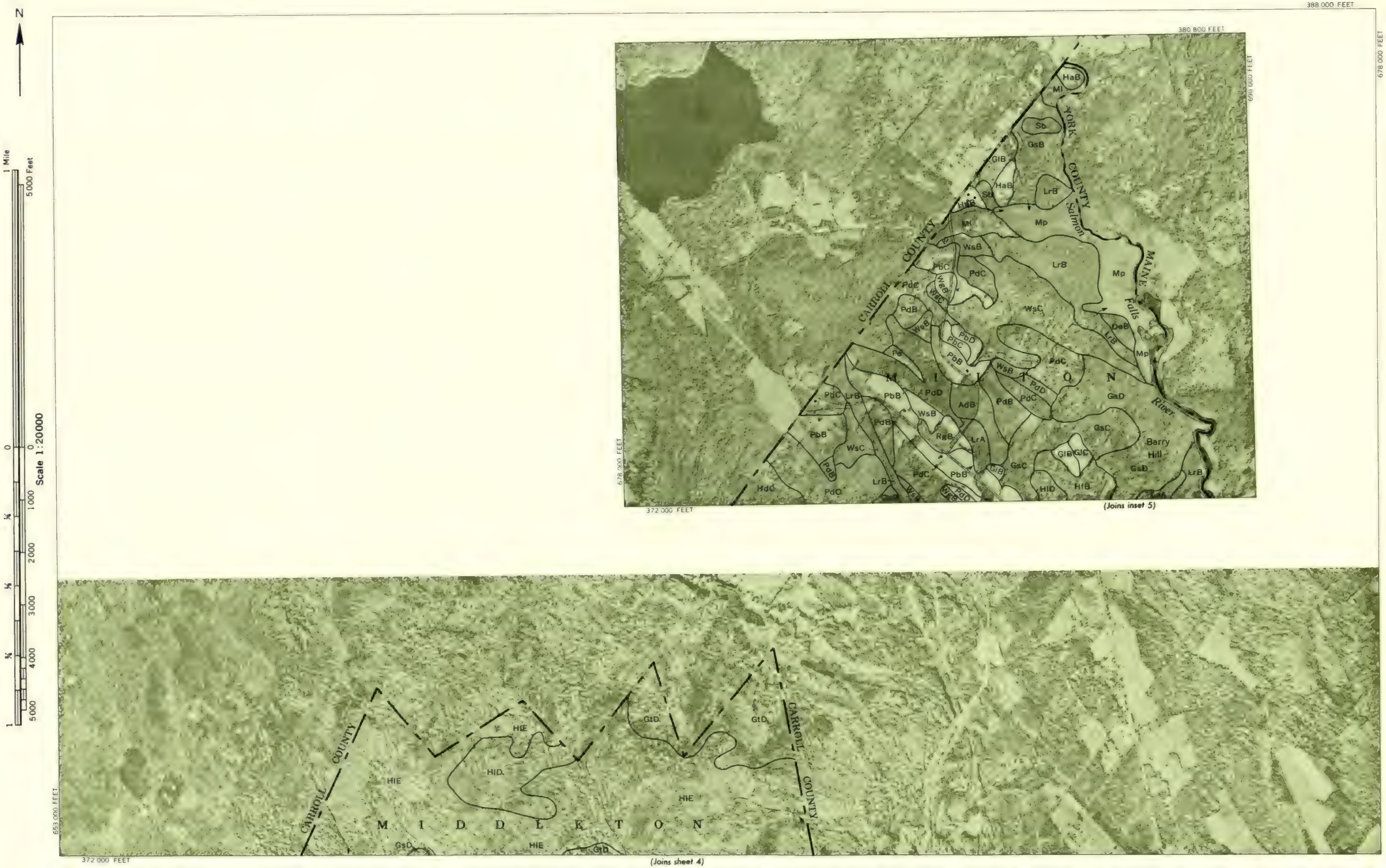
For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. The suitability of the soils for use as cropland is discussed in the soil descriptions. The capability classification is discussed on pages 40 through 42. Other information is given in tables as follows:

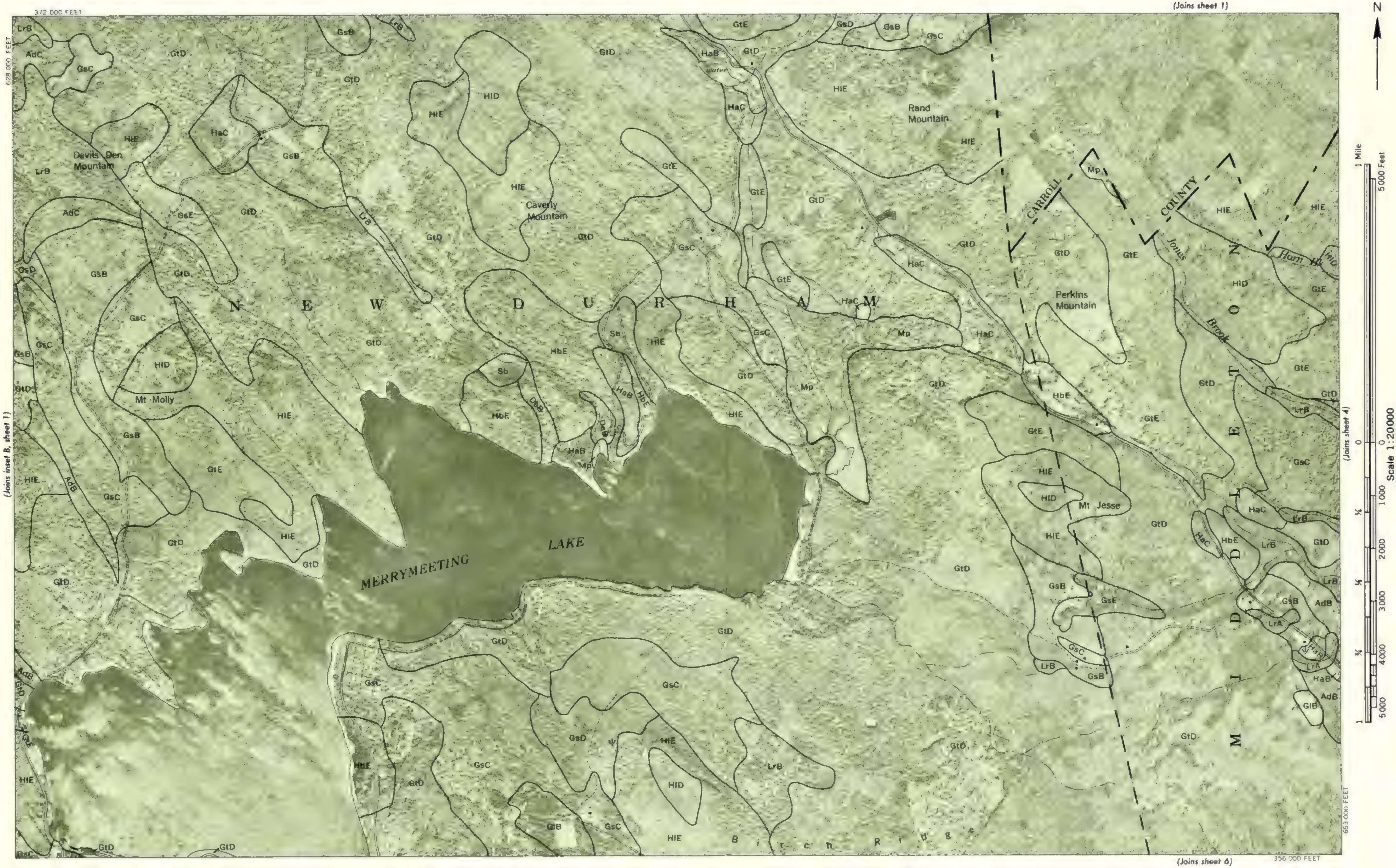
Acreage and extent, table 1, page 7.
Estimated average yields, table 2, page 43.
Suitability of soils for woodland, table 3, page 46.
Suitability of soils for wildlife, table 4, page 50.
Engineering uses of soils, tables 5, 6, and 7, pages 54 through 65.
Use of soils for recreation, table 8, page 72.
Use of soils for community development, table 9, page 78.

Map symbol	Mapping unit	Described on page	Capability unit Symbol
AcB	Acton fine sandy loam, 0 to 8 percent slopes	8	IIw-52
AdB	Acton very stony fine sandy loam, 0 to 8 percent slopes	9	VIs-72
AdC	Acton very stony fine sandy loam, 8 to 15 percent slopes	9	VIs-72
Be	Biddeford silty clay loam	9	VIw-34
BzA	Buxton silt loam, 0 to 3 percent slopes	10	IIw-32
BzB	Buxton silt loam, 3 to 8 percent slopes	10	IIw-32
CfB	Charlton fine sandy loam, 3 to 8 percent slopes	11	IIe-5
CfC	Charlton fine sandy loam, 8 to 15 percent slopes	11	IIIe-5
CfD	Charlton fine sandy loam, 15 to 25 percent slopes	11	IVe-5
CsB	Charlton very stony fine sandy loam, 3 to 8 percent slopes	12	VIs-7
CsC	Charlton very stony fine sandy loam, 8 to 15 percent slopes	12	VIs-7
CsD	Charlton very stony fine sandy loam, 15 to 25 percent slopes	12	VIs-7
CvD	Charlton extremely stony fine sandy loam, 8 to 25 percent slopes	12	VIIs-58
DeA	Deerfield loamy sand, 0 to 3 percent slopes	13	IIIw-22
DeB	Deerfield loamy sand, 3 to 8 percent slopes	13	IIIw-22
EaA	Elmwood fine sandy loam, 0 to 3 percent slopes	14	IIw-42
EaB	Elmwood fine sandy loam, 3 to 8 percent slopes	14	IIw-42
Fa	Fresh water marsh	14	VIIIw-89
GlB	Gloucester fine sandy loam, 3 to 8 percent slopes	15	IIs-55
GlC	Gloucester fine sandy loam, 8 to 15 percent slopes	15	IIIe-55
GsB	Gloucester very stony fine sandy loam, 3 to 8 percent slopes	15	VIs-7
GsC	Gloucester very stony fine sandy loam, 8 to 15 percent slopes	15	VIs-7
GsD	Gloucester very stony fine sandy loam, 15 to 25 percent slopes	15	VIs-7
GsE	Gloucester very stony fine sandy loam, 25 to 60 percent slopes	16	VIIs-7
GtD	Gloucester extremely stony fine sandy loam, 8 to 25 percent slopes	16	VIIs-58
GtE	Gloucester extremely stony fine sandy loam, 25 to 60 percent slopes	16	VIIs-58
Gv	Gravel and borrow pits	16	-------
HaA	Hinckley loamy sand, 0 to 3 percent slopes	17	IIIs-26
HaB	Hinckley loamy sand, 3 to 8 percent slopes	17	IIIs-26
HaC	Hinckley loamy sand, 8 to 15 percent slopes	17	IVs-26
HbE	Hinckley gravelly loamy sand, 15 to 60 percent slopes	18	VIIs-27
HcB	Hollis-Charlton fine sandy loams, 3 to 8 percent slopes	18	IIIe-56
HcC	Hollis-Charlton fine sandy loams, 8 to 15 percent slopes	18	IVe-56
HcD	Hollis-Charlton fine sandy loams, 15 to 25 percent slopes	19	VIe-56
HdB	Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes	19	VIs-57
HdC	Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes	19	VIs-57
HdD	Hollis-Charlton very rocky fine sandy loams, 15 to 25 percent slopes	19	VIs-57
HeD	Hollis-Charlton extremely rocky fine sandy loams, 8 to 25 percent slopes	20	VIIs-58
HeE	Hollis-Charlton extremely rocky fine sandy loams, 25 to 60 percent slopes	20	VIIs-58
HfB	Hollis-Gloucester fine sandy loams, 3 to 8 percent slopes	21	IIIe-56
HfC	Hollis-Gloucester fine sandy loams, 8 to 15 percent slopes	21	IVe-56
HgB	Hollis-Gloucester very rocky fine sandy loams, 3 to 8 percent slopes	21	VIs-57
HgC	Hollis-Gloucester very rocky fine sandy loams, 8 to 15 percent slopes	21	VIs-57
HgD	Hollis-Gloucester very rocky fine sandy loams, 15 to 25 percent slopes	22	VIs-57
HlD	Hollis-Gloucester extremely rocky fine sandy loams, 8 to 25 percent slopes	22	VIIs-58
HlE	Hollis-Gloucester extremely rocky fine sandy loams, 25 to 60 percent slopes	22	VIIs-58
LcB	Leicester fine sandy loam, 0 to 8 percent slopes	23	IIIw-53
LeA	Leicester very stony fine sandy loam, 0 to 3 percent slopes	23	VIIs-73
LeB	Leicester very stony fine sandy loam, 3 to 8 percent slopes	23	VIIs-73
LrA	Leicester-Ridgebury very stony fine sandy loams, 0 to 3 percent slopes	23	VIIs-73
LrB	Leicester-Ridgebury very stony fine sandy loams, 3 to 8 percent slopes	23	VIIs-73
Ma	Made land	24	--------
Ml	Mixed alluvial land, wet	24	VIIw-14
Mp	Muck and peat	24	--------
On	Ondawa fine sandy loam	24	I-1
PbB	Paxton fine sandy loam, 0 to 8 percent slopes	25	IIe-6
PbC	Paxton fine sandy loam, 8 to 15 percent slopes	25	IIIe-6
PbD	Paxton fine sandy loam, 15 to 25 percent slopes	26	IVe-6
PdB	Paxton very stony fine sandy loam, 3 to 8 percent slopes	26	VIs-7
PdC	Paxton very stony fine sandy loam, 8 to 15 percent slopes	26	VIs-7
PdD	Paxton very stony fine sandy loam, 15 to 25 percent slopes	26	VIs-7
PdE	Paxton very stony fine sandy loam, 25 to 60 percent slopes	26	VIIs-7
Po	Podunk fine sandy loam	27	IIw-12
RgA	Ridgebury fine sandy loam, 0 to 3 percent slopes	28	IIIw-63
RgB	Ridgebury fine sandy loam, 3 to 8 percent slopes	28	IIIw-63
RlA	Ridgebury very stony fine sandy loam, 0 to 3 percent slopes	28	VIIs-73
RlB	Ridgebury very stony fine sandy loam, 3 to 8 percent slopes	28	VIIs-73
Ro	Rock outcrop	28	VIIIs-90
Ru	Rumney fine sandy loam	29	IIIw-13
Sb	Saugatuck loamy sand	29	Vw-23
ScA	Scantic silt loam, 0 to 3 percent slopes	30	IVw-33
ScB	Scantic silt loam, 3 to 8 percent slopes	30	IVw-33
SfC	Suffield silt loam, 8 to 15 percent slopes	31	IIIe-3
SfE	Suffield silt loam, 15 to 35 percent slopes	31	IVe-3
Sk	Suncook loamy sand	32	IIIs-16
SnB	Sutton fine sandy loam, 0 to 8 percent slopes	32	IIw-52
SuB	Sutton very stony fine sandy loam, 0 to 8 percent slopes	33	VIs-72
SwA	Swanton fine sandy loam, 0 to 3 percent slopes	33	IIIw-43
SwB	Swanton fine sandy loam, 3 to 8 percent slopes	33	IIIw-43
Ta	Tidal marsh	34	VIIIw-89
Wa	Whitman very stony fine sandy loam	34	VIIs-74
WdA	Windsor loamy sand, 0 to 3 percent slopes	36	IIIs-26
WdB	Windsor loamy sand, 3 to 8 percent slopes	36	IIIs-26
WdC	Windsor loamy sand, 8 to 15 percent slopes	36	IVs-26
WdE	Windsor loamy sand, 15 to 60 percent slopes	37	VIIs-26
WfB	Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes	37	IIs-4
WfC	Windsor loamy fine sand, clay subsoil variant, 8 to 15 percent slopes	37	IIIe-4
WgB	Woodbridge fine sandy loam, 0 to 8 percent slopes	39	IIw-62
WsB	Woodbridge very stony fine sandy loam, 0 to 8 percent slopes	39	VIs-72
WsC	Woodbridge very stony fine sandy loam, 8 to 15 percent slopes	39	VIs-72

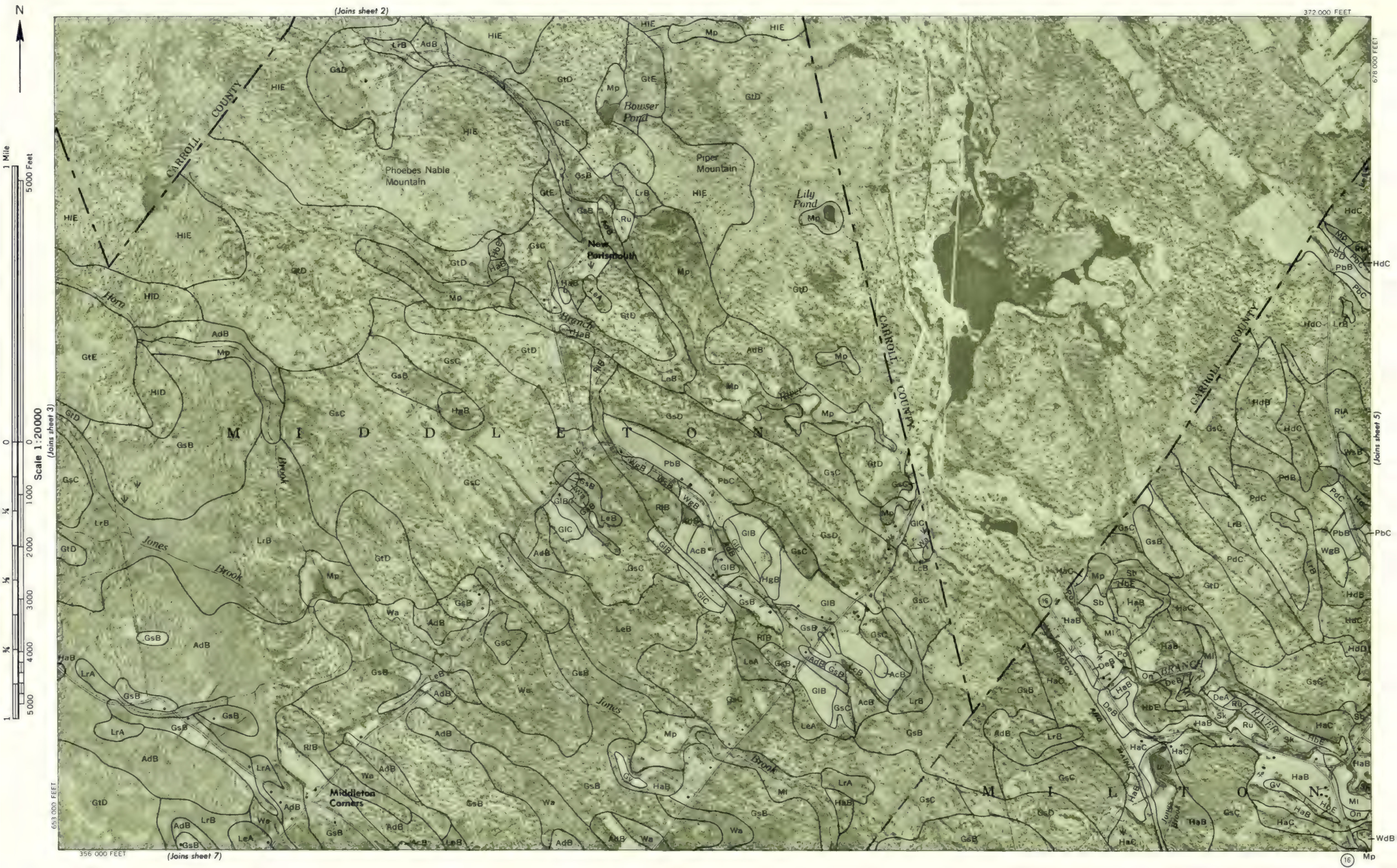
460-639 O - 73 (Faces maps) No. 1


388 000 FEET
627 400 FEET
(Joins inset A)
391 850 FEET
640 700 FEET
644 600 FEET
(Joins upper right)
388 000 FEET
INSET A
CARROLL COUNTY
NEW DURHAM
CARROLL COUNTY
BELKNAP COUNTY
Heath Brook
Perry Brook
Beaver Brook
Shaws Pond
Hayes Hill
647 400 FEET
372 000 FEET
(Joins inset B)
(Joins sheet 3)
372 000 FEET
(Joins lower left)
625 000 FEET
628 000 FEET
356 000 FEET
(Joins sheet 6)
(Joins sheet 3)
INSET B
Mt Bet
BELKNAP COUNTY
NEW DURHAM
N
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1


N
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
Scale 1:20000
388 000 FEET
380 800 FEET
678 000 FEET
372 000 FEET
(Joins inset 5)
CARROLL COUNTY
YORK COUNTY
MAINE
Salmon Falls River
M I L T O N
Barry Hill
HaB
Ml
Sb
GsB
GlB
LrB
Mp
Mk
WsB
PdC
PbC
WsC
PdB
PbD
DeB
PdD
AdB
GsD
GsC
RgB
LrA
HlD
HfB
HdC
653 000 FEET
372 000 FEET
(Joins sheet 4)
CARROLL COUNTY
M I D D L E T O N
HlE
HlD
GtD
GsD


N
372 000 FEET
628 000 FEET
(Joins sheet 1)
(Joins inset B, sheet 1)
(Joins sheet 4)
(Joins sheet 6)
653 000 FEET
356 000 FEET
Devils Den Mountain
Caverly Mountain
Rand Mountain
Perkins Mountain
Mt Molly
Mt Jesse
N E W D U R H A M
M I D D L E T O N
CARROLL COUNTY
Jones Brook
MERRYMEETING LAKE
Birch Ridge
water
1 Mile
5000 Feet
Scale 1:20000

4

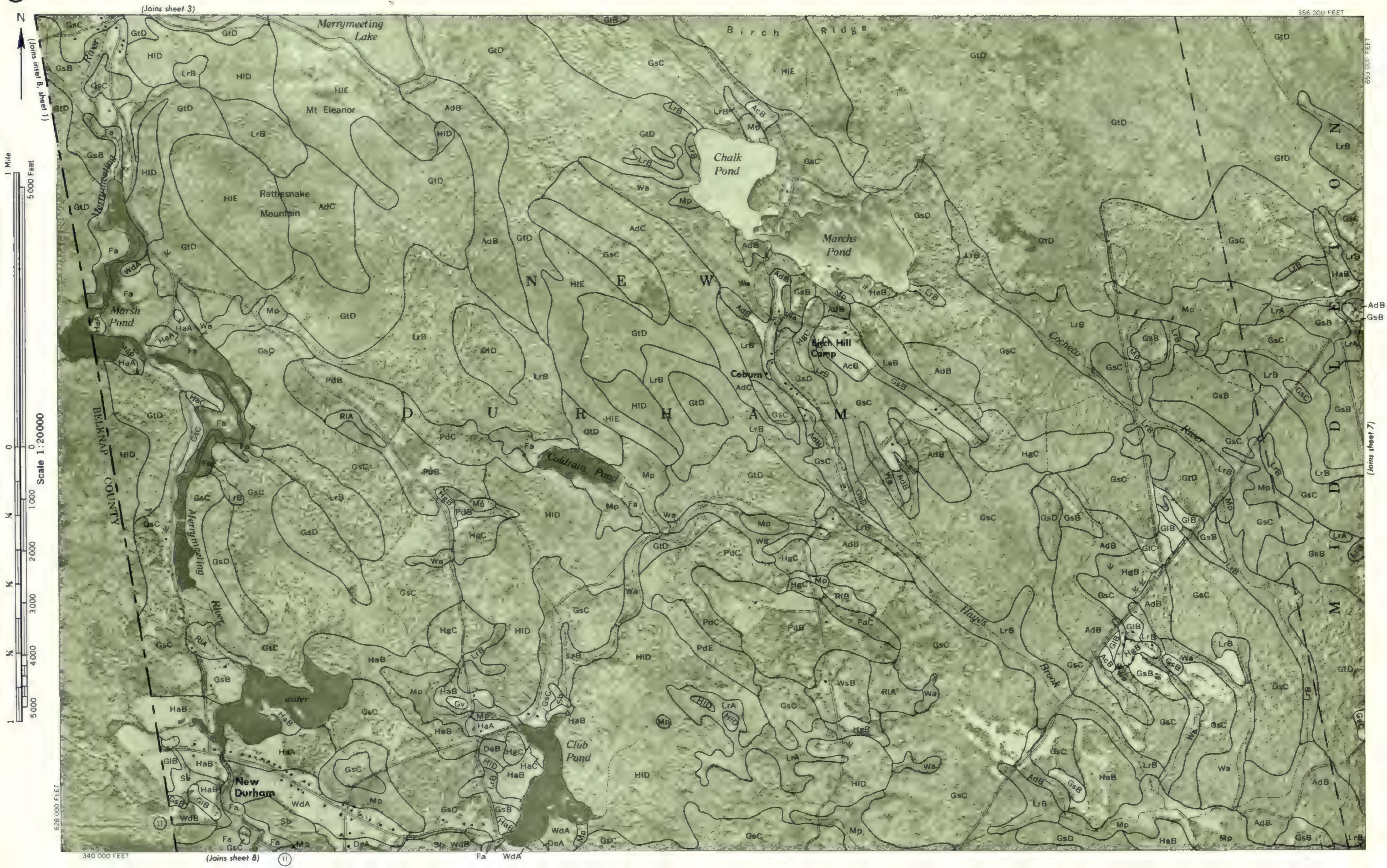

N
(Joins sheet 2)
372 000 FEET
678 000 FEET
(Joins sheet 5)
(Joins sheet 3)
(Joins sheet 7)
356 000 FEET
653 000 FEET
1 Mile
5000 Feet
Scale 1:20000
CARROLL COUNTY
Phoebes Nable Mountain
Piper Mountain
Bowser Pond
Lily Pond
New Portsmouth
Horn Branch
Piper
Jones Brook
Middleton Corners
M I D D L E T O N
M I L T O N
RIVER
BRANCH

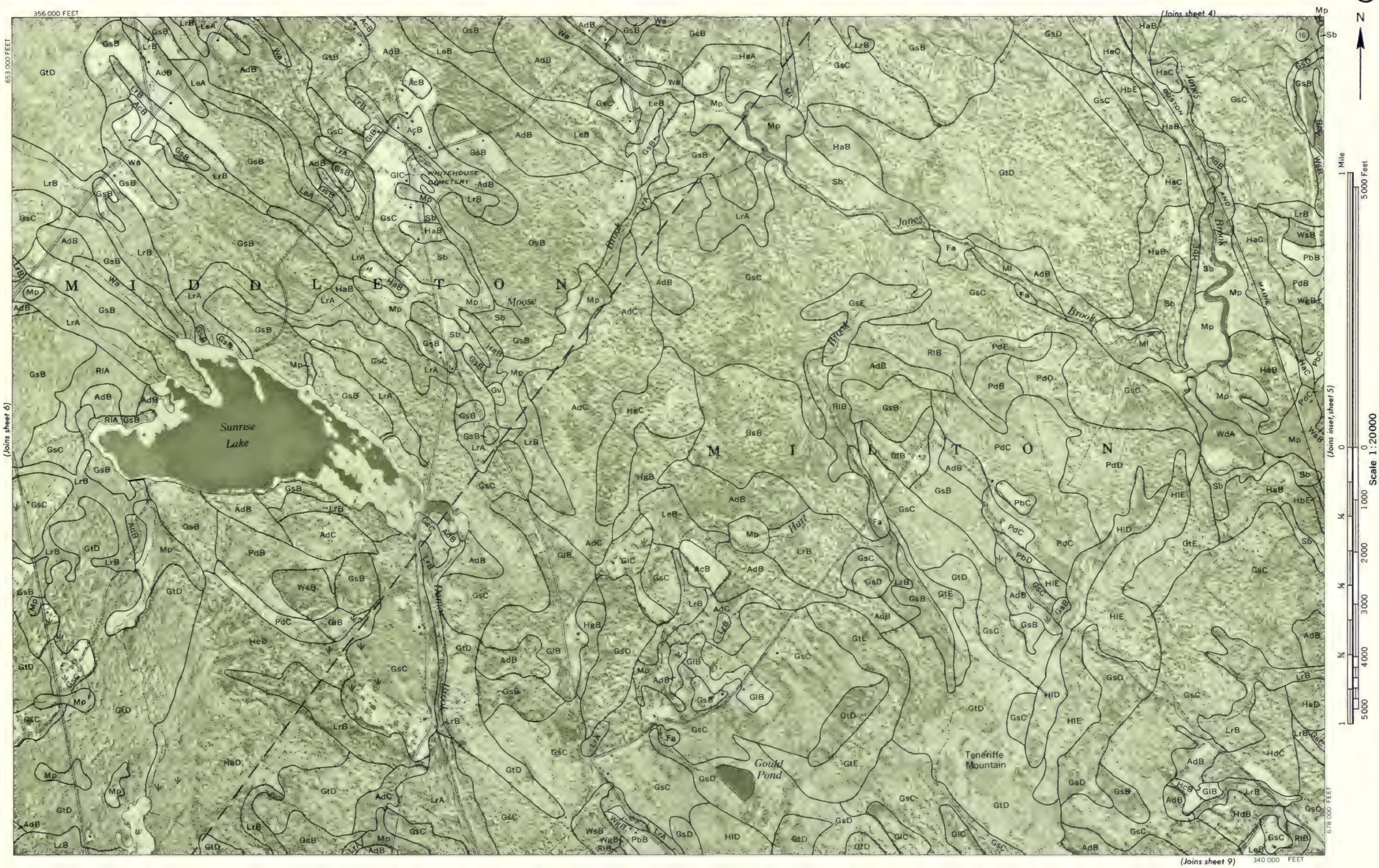
5

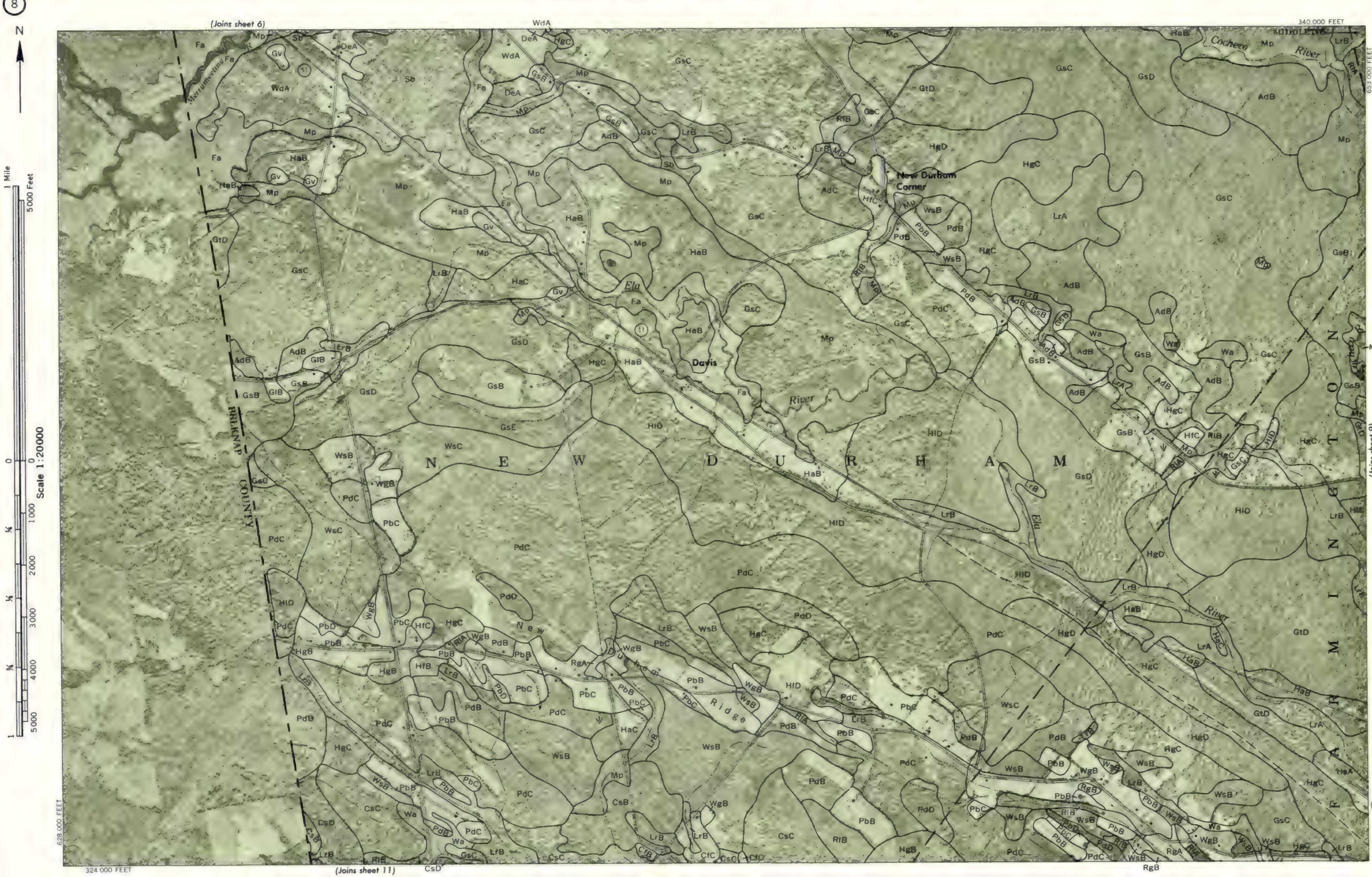

372 000 FEET
(Joins inset, sheet 2)
678 000 FEET
(Joins sheet 4)
(Joins upper right)
356 000 FEET
689 000 FEET
CARROLL COUNTY
YORK COUNTY
MAINE
M I L T O N
Milton Mills
Miller Brook
Salmon Falls River
BRANCH RIVER
Laskey Corner

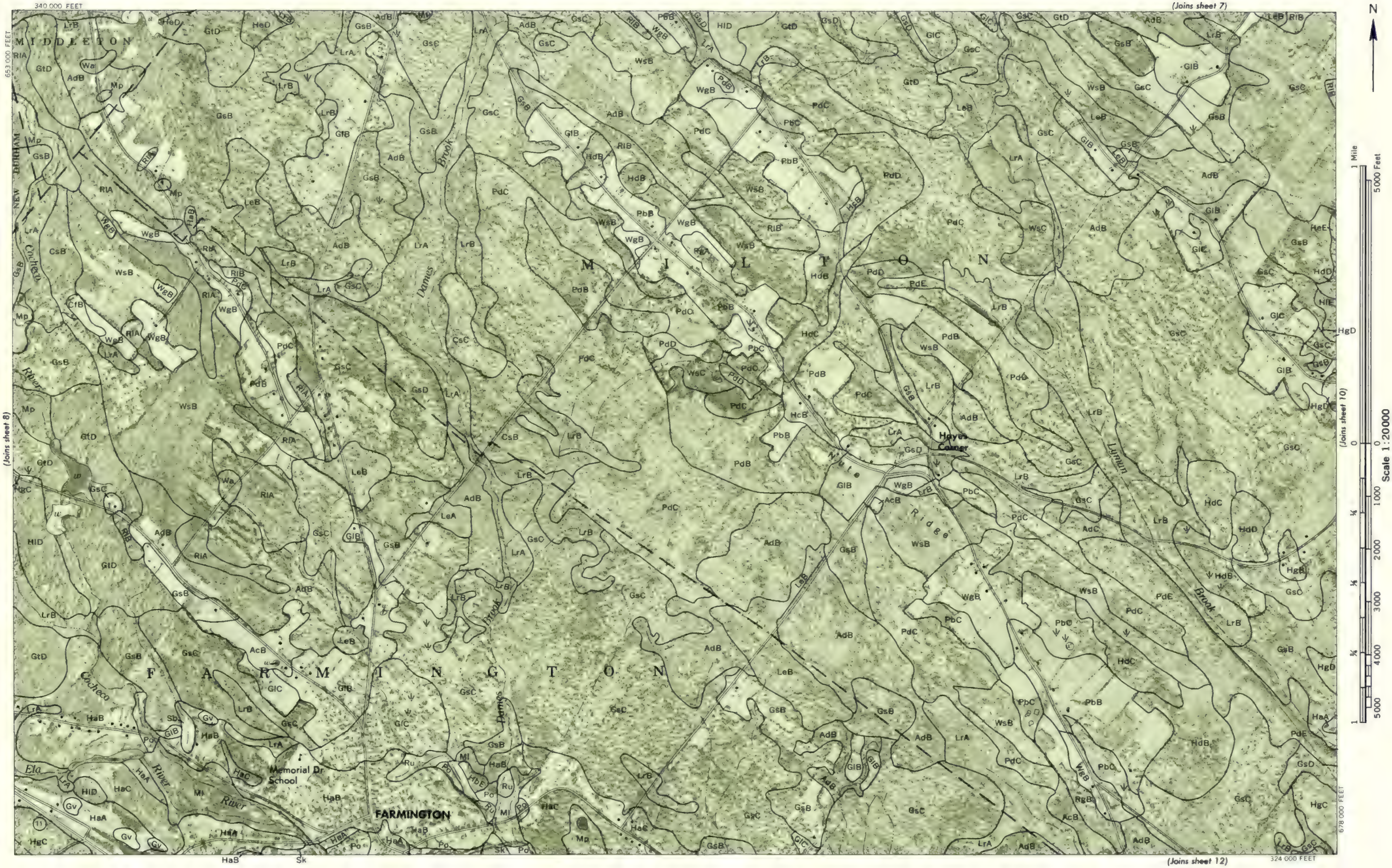

356 000 FEET
(Joins lower left)
678 000 FEET
(Joins sheet 7)
(Joins sheet 10)
340 000 FEET
688 000 FEET
M I L T O N
Milton Ridge
BRANCH RIVER
Salmon Falls River
YORK COUNTY
MAINE
YORK RIVER
FALLS
SALMON
Northeast Pond
BOSTON AND MAINE
Town House
Town House Pond


N
1 Mile
5000 Feet
Scale 1:20000

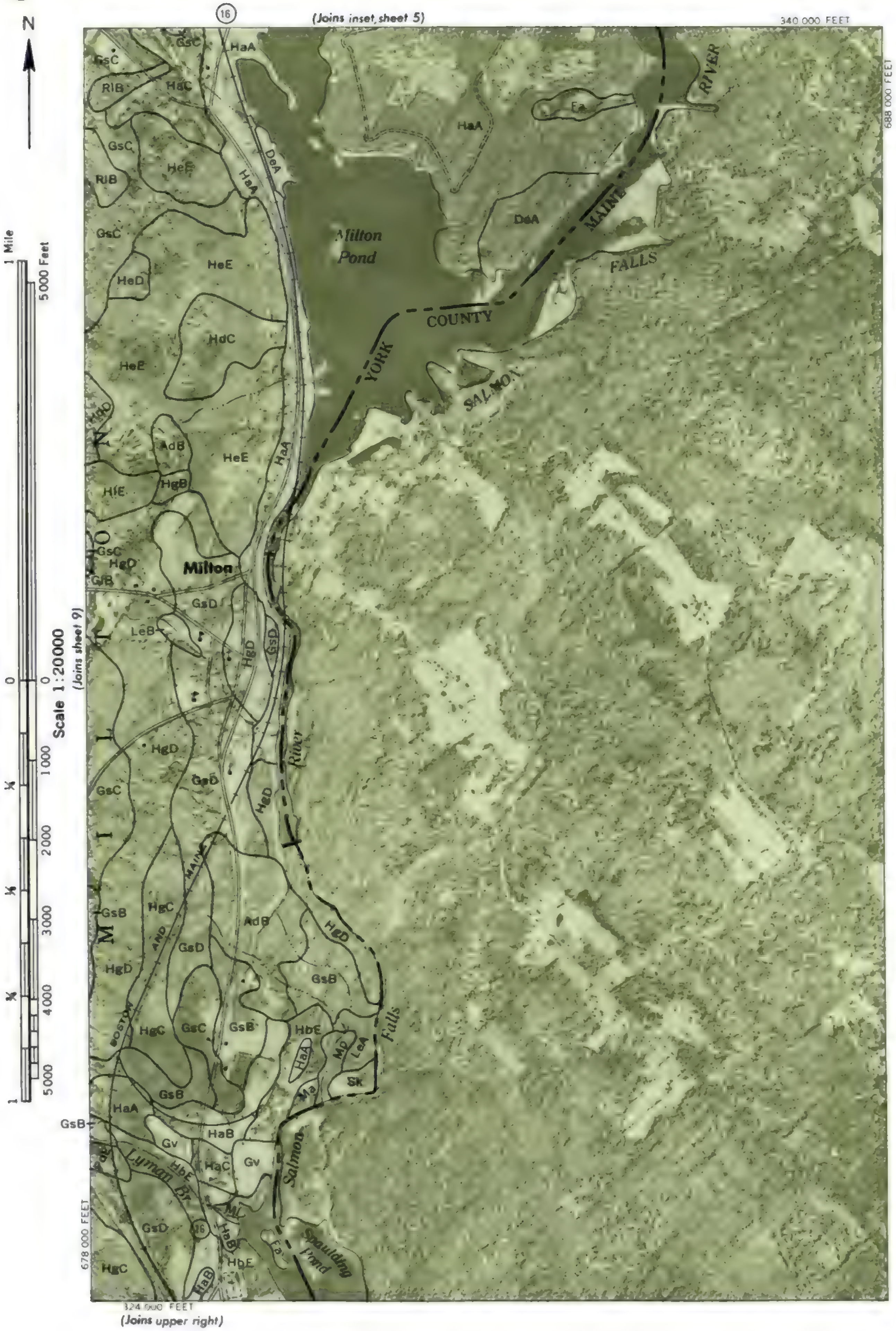

(Joins sheet 3)
(Joins inset B, sheet 1)
(Joins sheet 7)
(Joins sheet 8)
N
1 Mile
5000 Feet
Scale 1:20000
356 000 FEET
653 000 FEET
340 000 FEET
628 000 FEET
Merrymeeting Lake
Birch Ridge
Mt Eleanor
Rattlesnake Mountain
Chalk Pond
Marchs Pond
Marsh Pond
Merrymeeting River
Coldrain Pond
Birch Hill Camp
Coburn
Cocheco River
Hayes Brook
Club Pond
New Durham
water
BELKNAP COUNTY
N E W D U R H A M
M I D D L E T O N

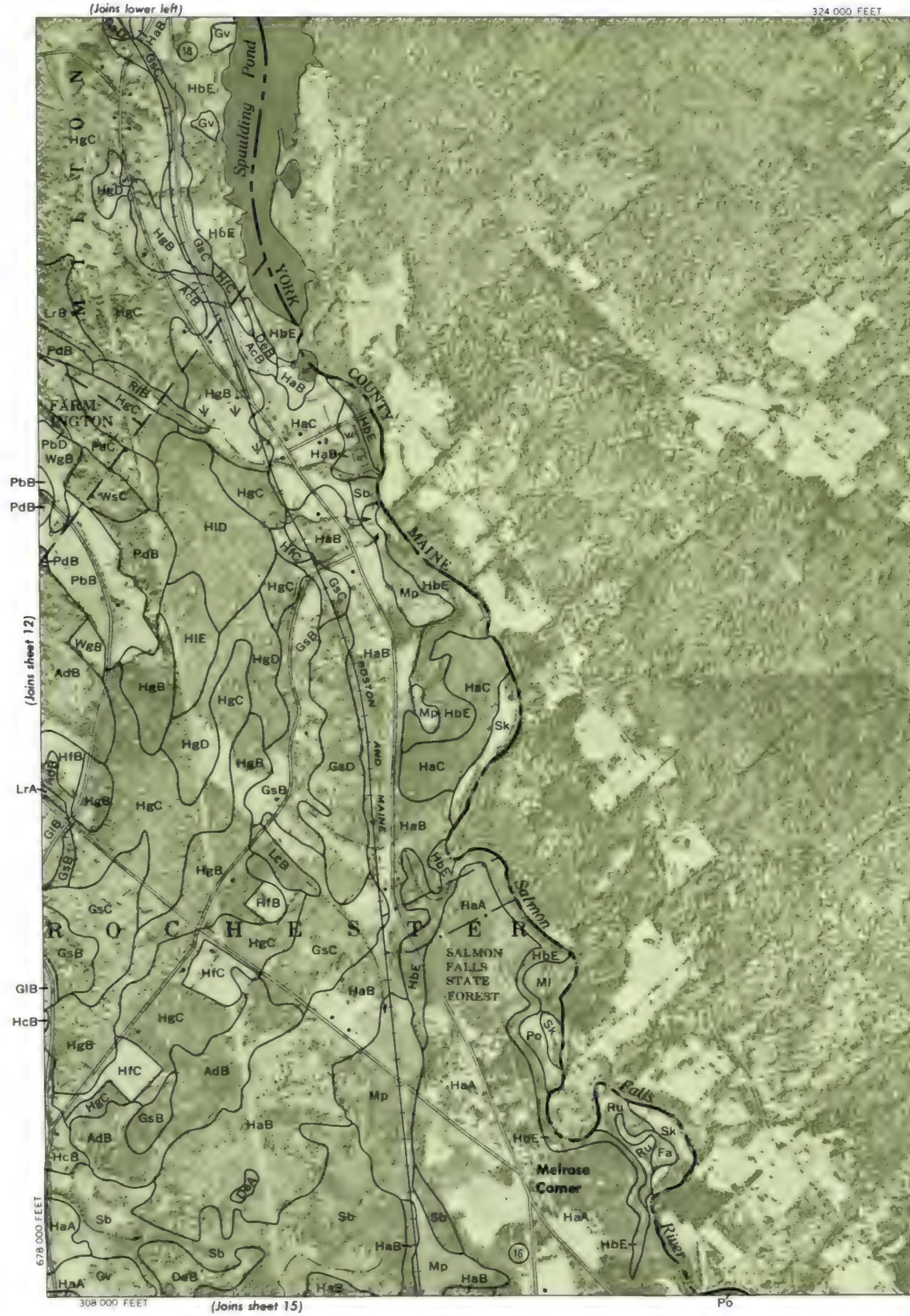

7
N
356 000 FEET
653 000 FEET
(Joins sheet 4)
(Joins sheet 6)
(Joins inset, sheet 5)
(Joins sheet 9)
678 000 FEET
340 000 FEET
M I D D L E T O N
M I L T O N
Sunrise Lake
Gould Pond
Teneriffe Mountain
WHITEHOUSE CEMETERY
Moose
Jones
Jones Brook
Brook
Hart
BOSTON AND MAINE
16
1 Mile
5000 Feet
Scale 1:20000

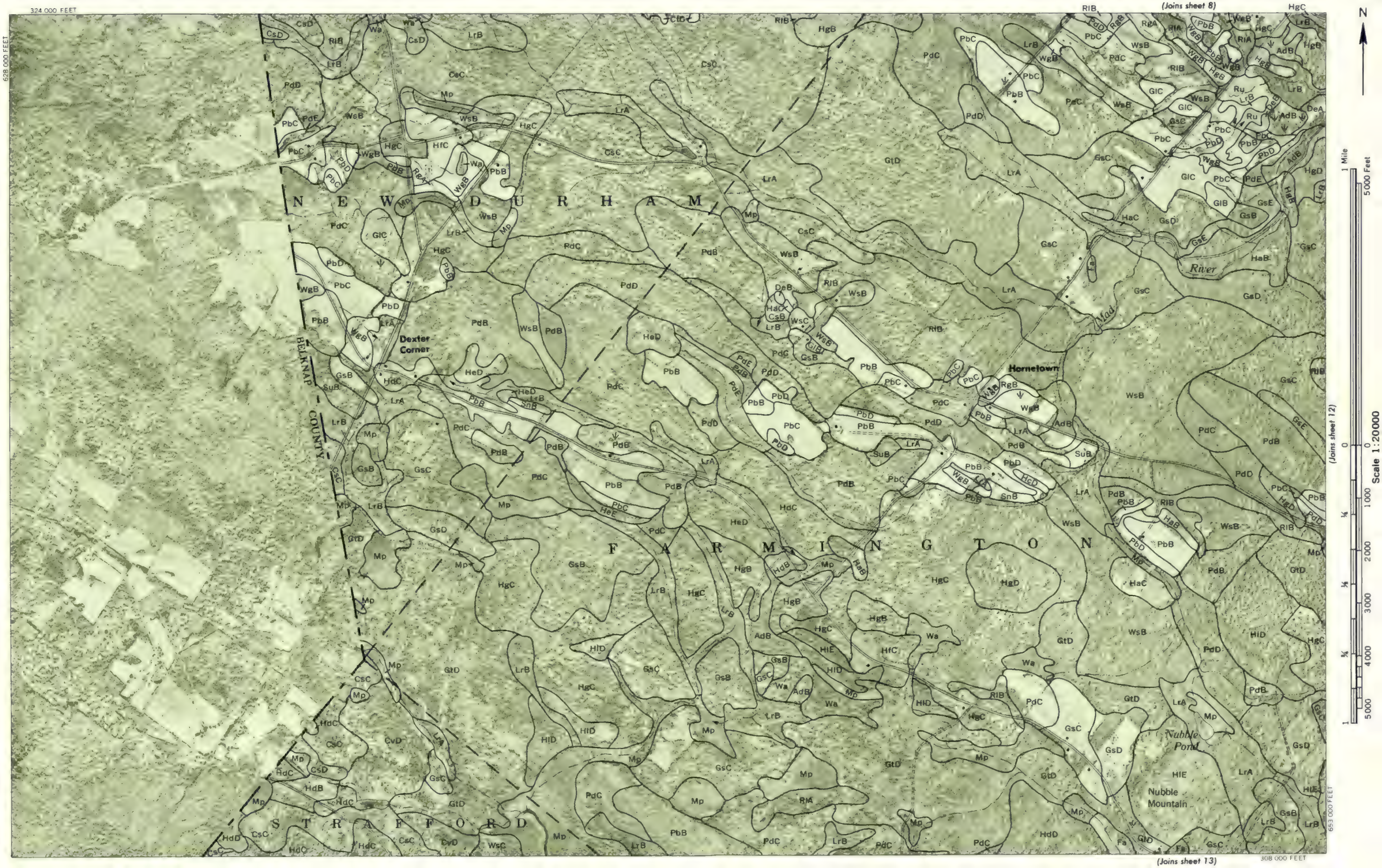

8
N
(Joins sheet 6)
(Joins sheet 9)
(Joins sheet 11)
340 000 FEET
653 000 FEET
628 000 FEET
324 000 FEET
1 Mile
5000 Feet
Scale 1:20000
N E W D U R H A M
F A R M I N G T O N
BELKNAP COUNTY
MIDDLETON
New Durham Corner
Davis
Ela River
Cocheco River
Merrymeeting
New Durham Ridge


340 000 FEET
653 000 FEET
(Joins sheet 7)
MIDDLETON
NEW DURHAM
M I L T O N
F A R M I N G T O N
Hayes Corner
Memorial Dr School
FARMINGTON
Cocheco River
Ela River
Dames Brook
Lyman Brook
Nute Ridge
(Joins sheet 8)
(Joins sheet 10)
(Joins sheet 12)
678 000 FEET
324 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000

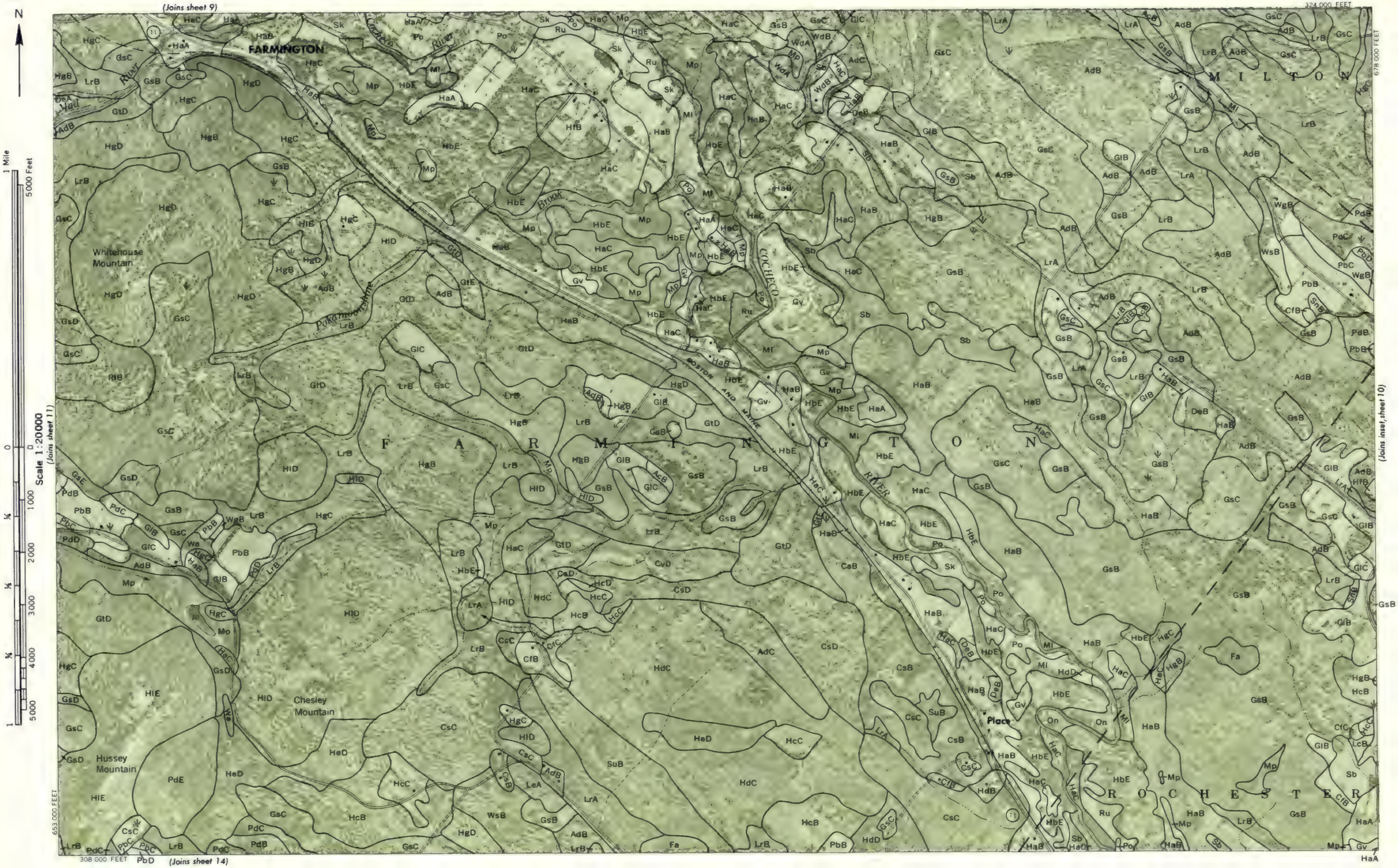
STRAFFORD COUNTY, NEW HAMPSHIRE — SHEET NUMBER 10

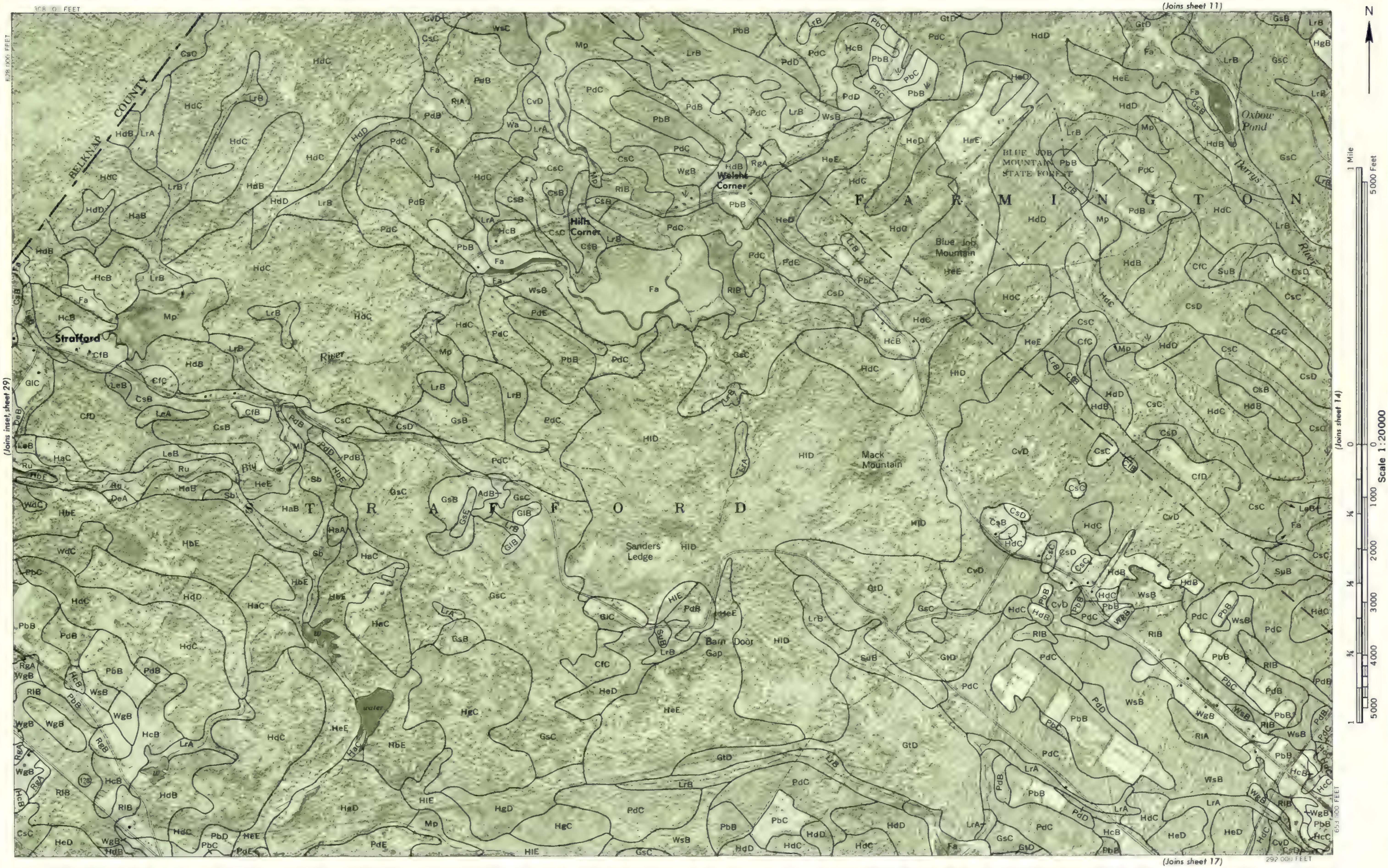


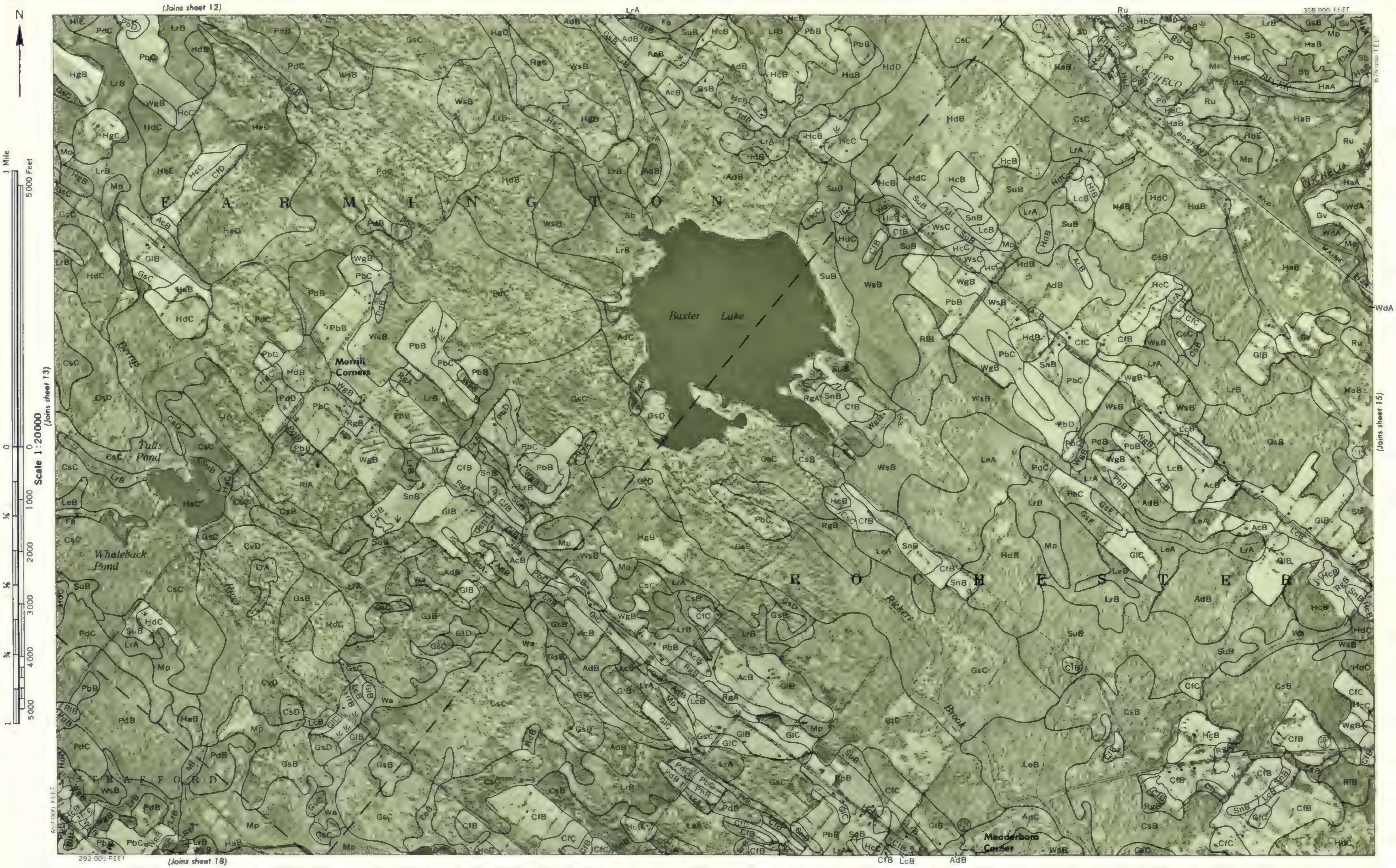


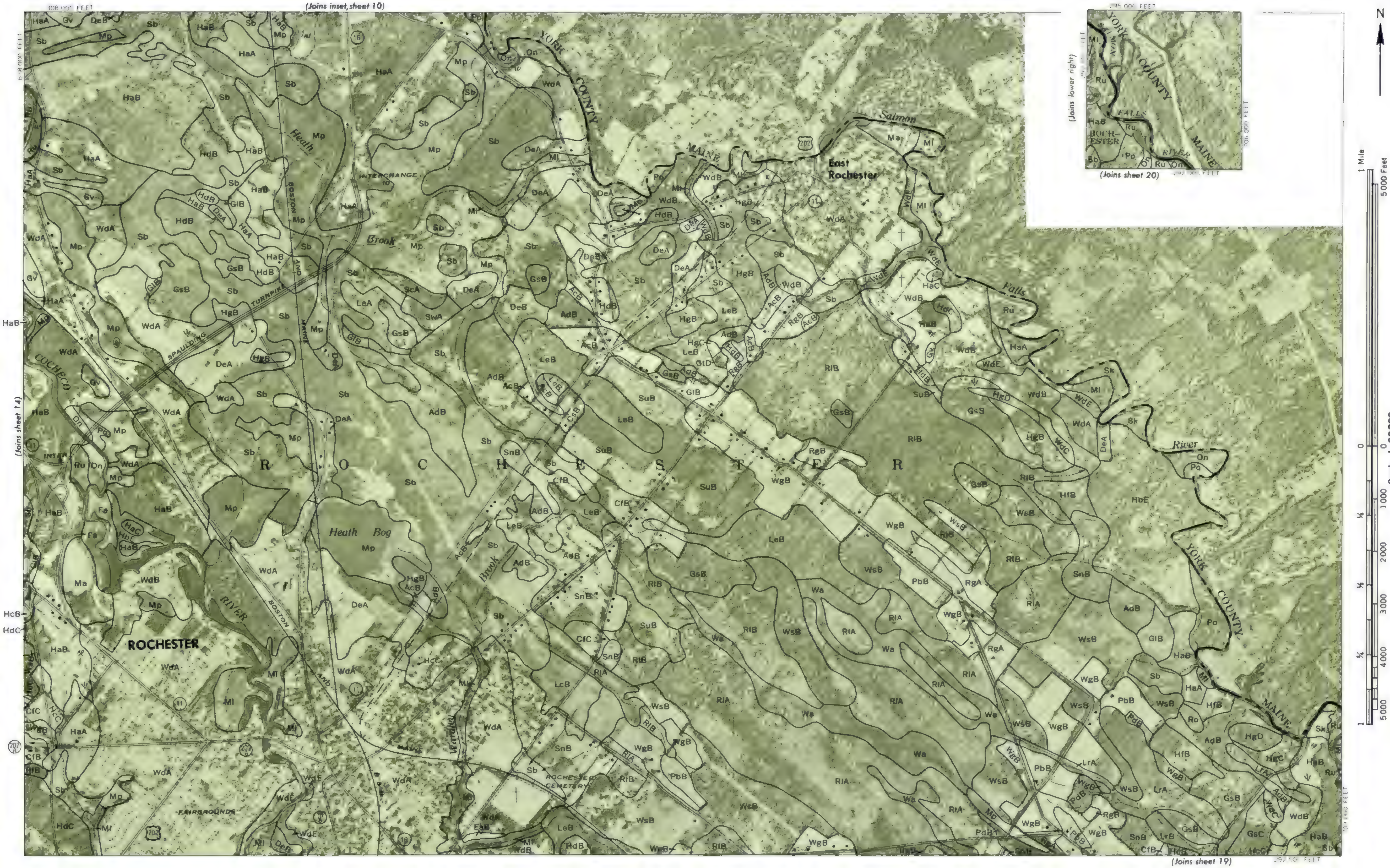

324 000 FEET
628 000 FEET
(Joins sheet 8)
N
NEW DURHAM
FARMINGTON
STRAFFORD
BELKNAP COUNTY
Dexter Corner
Hornetown
Mad River
Nubble Pond
Nubble Mountain
(Joins sheet 12)
1 Mile
5000 Feet
Scale 1:20000
653 000 FEET
308 000 FEET
(Joins sheet 13)

STRAFFORD COUNTY, NEW HAMPSHIRE — SHEET NUMBER 12

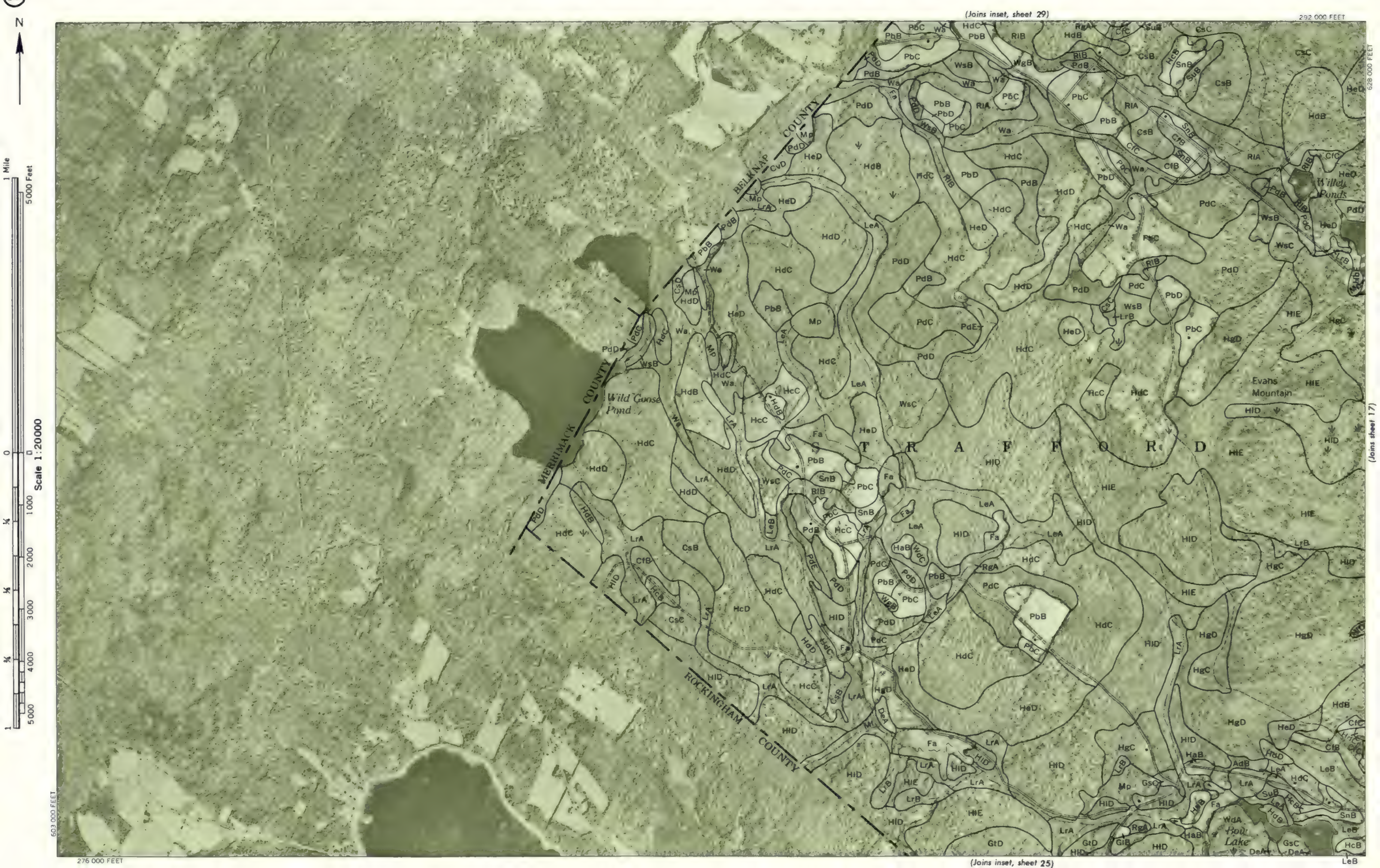


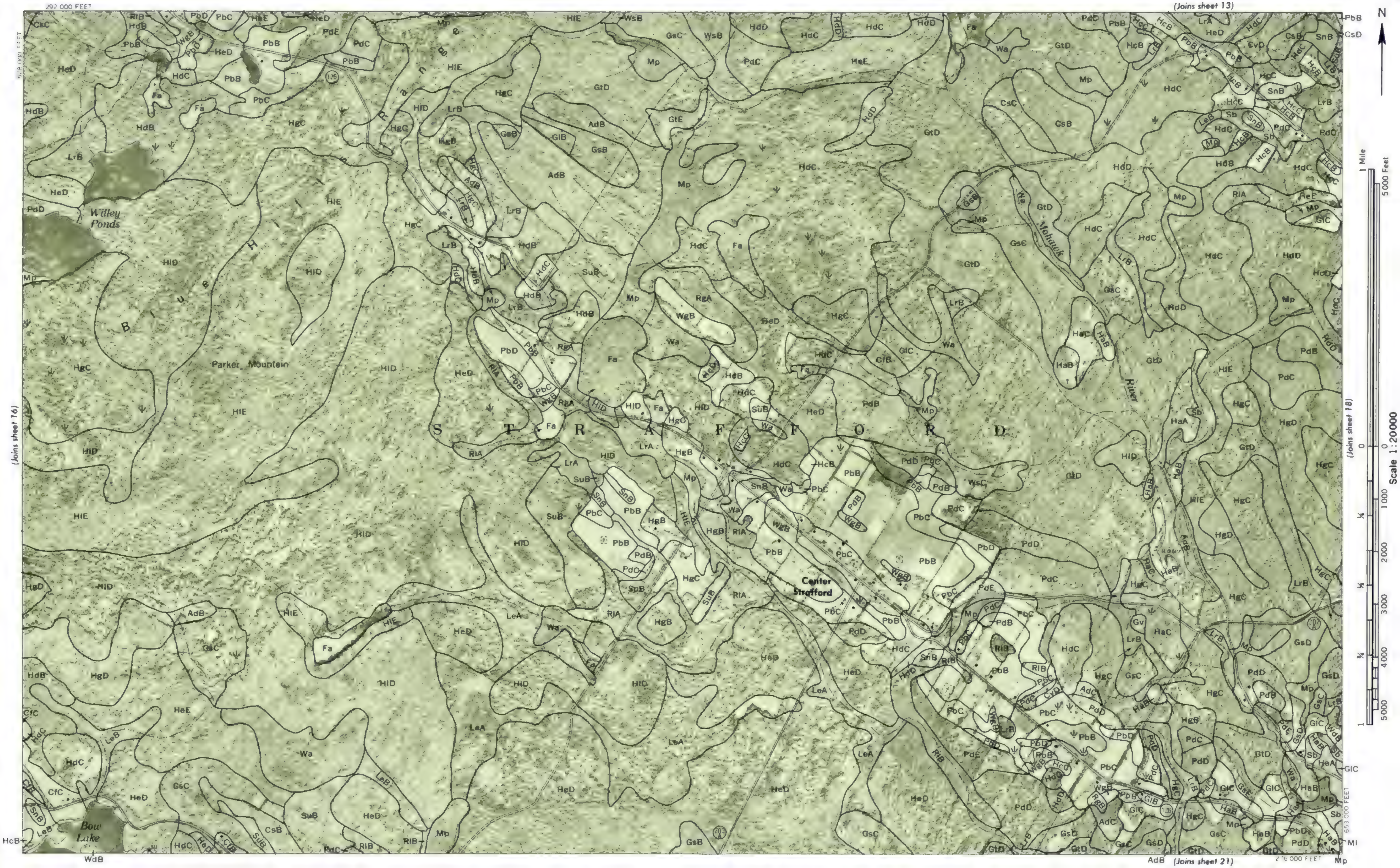

(Joins sheet 11)
(Joins sheet 14)
(Joins sheet 17)
(Joins inset, sheet 29)
N
Scale 1:20000
1 Mile
5000 Feet
BELKNAP COUNTY
FARMINGTON
STRAFFORD
Strafford
Hills Corner
Welch Corner
BLUE JOB MOUNTAIN STATE FOREST
Blue Job Mountain
Mack Mountain
Sanders Ledge
Barn Door Gap
Oxbow Pond
Berrys River
River
Big
water

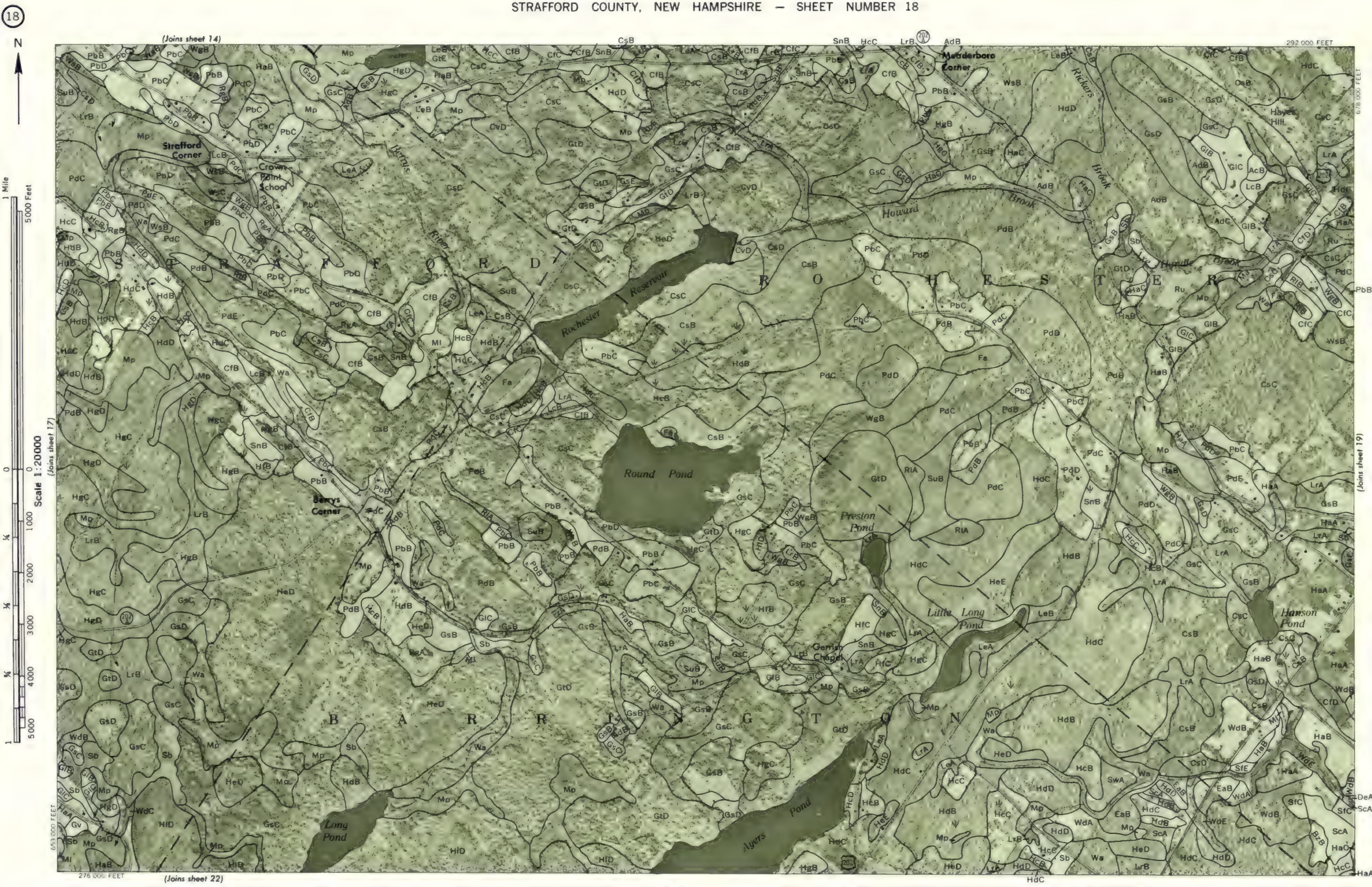

N
1 Mile
5000 Feet
Scale 1:20000
(Joins sheet 12)
(Joins sheet 13)
(Joins sheet 15)
(Joins sheet 18)
F A R M I N G T O N
R O C H E S T E R
S T R A F F O R D
Baxter Lake
Merrill Corners
Tufts Pond
Whaleback Pond
Rickers Brook
Berrys River
Meaderboro Corner
COCHECO RIVER
BOSTON AND MAINE
308 000 FEET
678 000 FEET
292 000 FEET
648 000 FEET

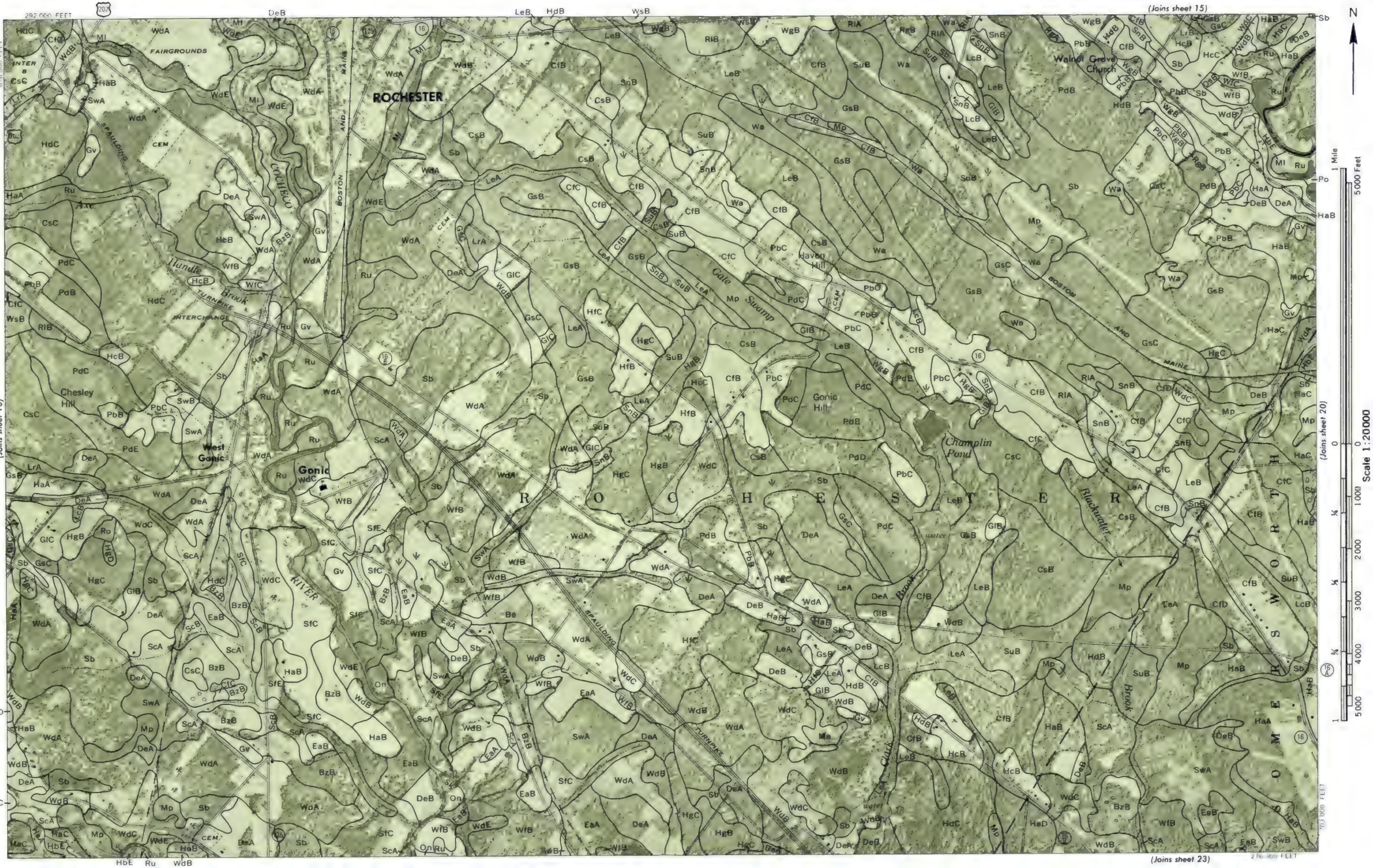


(Joins inset, sheet 10)
(Joins sheet 14)
(Joins sheet 19)
(Joins sheet 20)
(Joins lower right)
N
Scale 1:20000
1 Mile
5000 Feet
ROCHESTER
East Rochester
ROCH-ESTER
R O C H E S T E R
YORK COUNTY
MAINE
Salmon Falls River
COCHECO RIVER
Heath Brook
Heath Bog
Wardley Brook
SPAULDING TURNPIKE
INTERCHANGE
BOSTON AND MAINE
ROCHESTER CEMETERY
FAIRGROUNDS

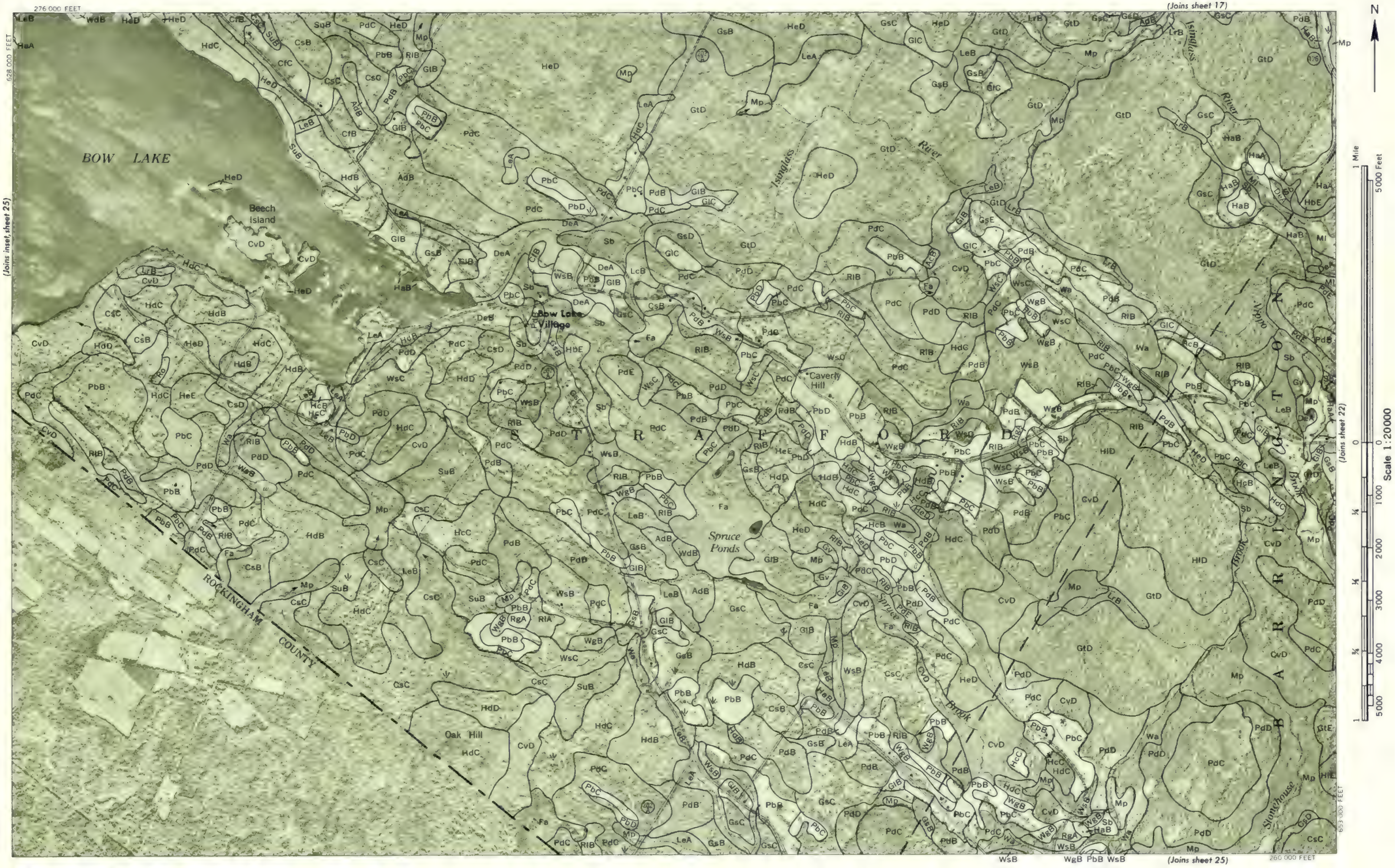

N
1 Mile
5000 Feet
Scale 1:20000
(Joins inset, sheet 29)
292 000 FEET
628 000 FEET
(Joins sheet 17)
(Joins inset, sheet 25)
276 000 FEET
603 000 FEET
BELKNAP COUNTY
MERRIMACK COUNTY
ROCKINGHAM COUNTY
STRAFFORD
Wild Goose Pond
Willey Ponds
Evans Mountain
Bow Lake

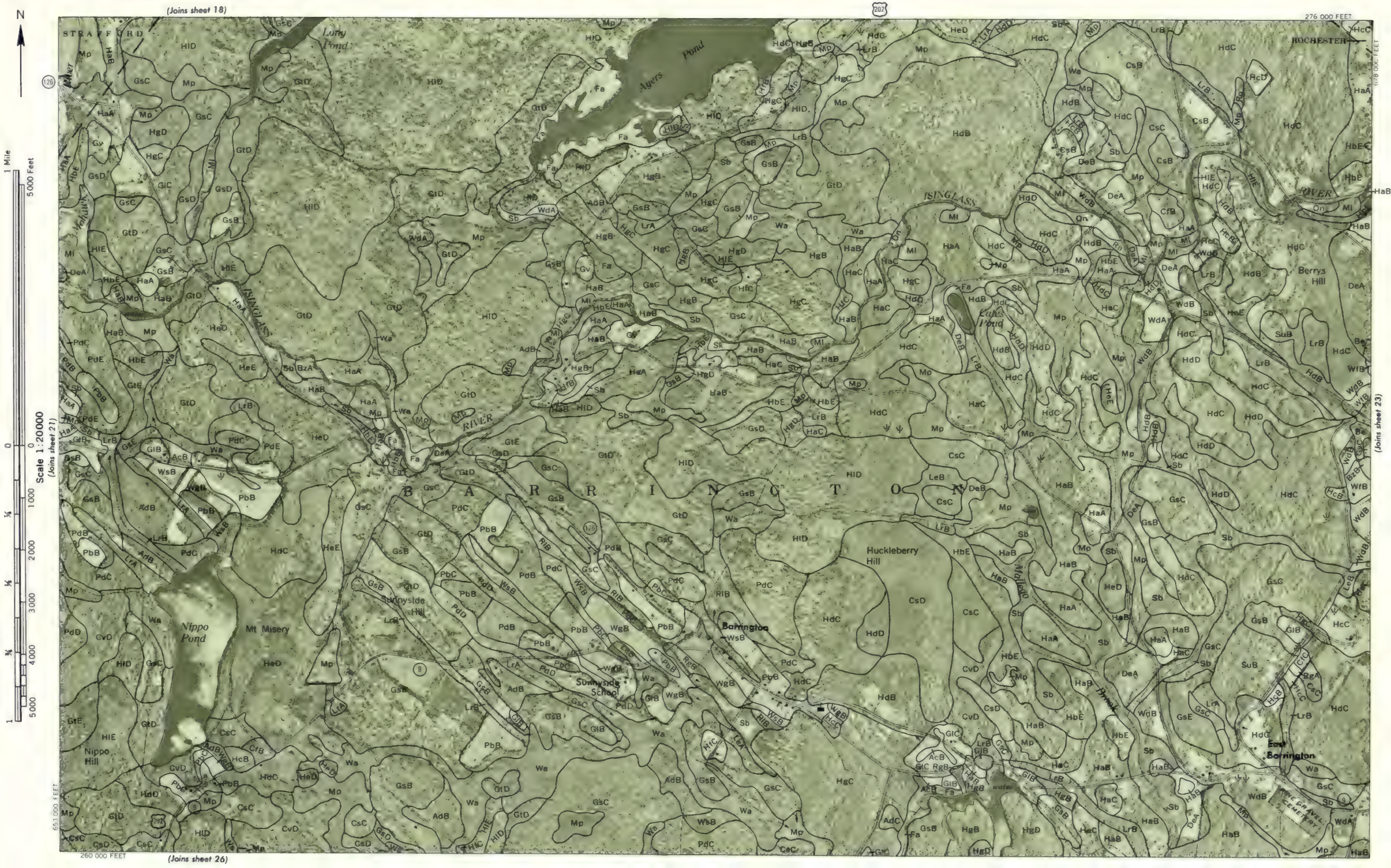

(Joins sheet 13)
(Joins sheet 16)
(Joins sheet 18)
(Joins sheet 21)
N
292 000 FEET
528 000 FEET
653 000 FEET
276 000 FEET
Willey Ponds
Parker Mountain
Blue Hills Range
STRAFFORD
Center Strafford
Mohawk River
Bow Lake
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
¼
½
¾
1

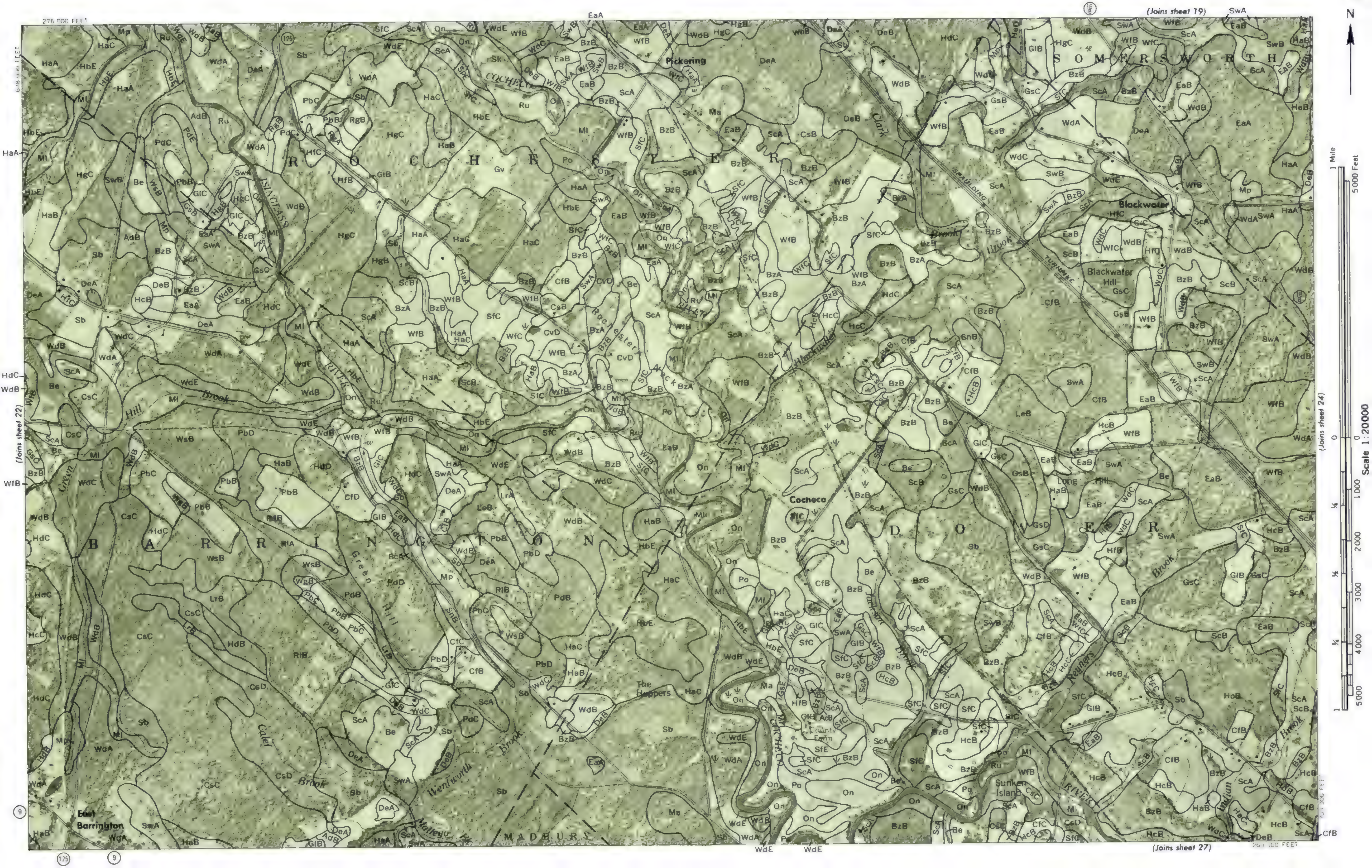

18
N
(Joins sheet 14)
(Joins sheet 17)
(Joins sheet 19)
(Joins sheet 22)
Scale 1:20000
1 Mile
5000 Feet
292 000 FEET
678 000 FEET
276 000 FEET
653 000 FEET
Strafford Corner
Crown Point School
Berrys Corner
Meaderboro Corner
Hayes Hill
Rochester Reservoir
Round Pond
Preston Pond
Little Long Pond
Hanson Pond
Long Pond
Ayers Pond
Gerrish Chapel
Howard Brook
Rickers Brook
Berrys River
S T R A F F O R D
R O C H E S T E R
B A R R I N G T O N


(Joins sheet 15)
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 23)
N
Scale 1:20000
1 Mile
5000 Feet
ROCHESTER
FAIRGROUNDS
Walnut Grove Church
Haven Hill
Gonic Hill
Chesley Hill
West Gonic
Gonic
Champlin Pond
Gate Swamp
Handle Brook
Blackwater Brook
Clark Brook
COCHECO
RIVER
BOSTON AND MAINE
SPAULDING TURNPIKE
INTERCHANGE
R O C H E S T E R
S O M E R S W O R T H

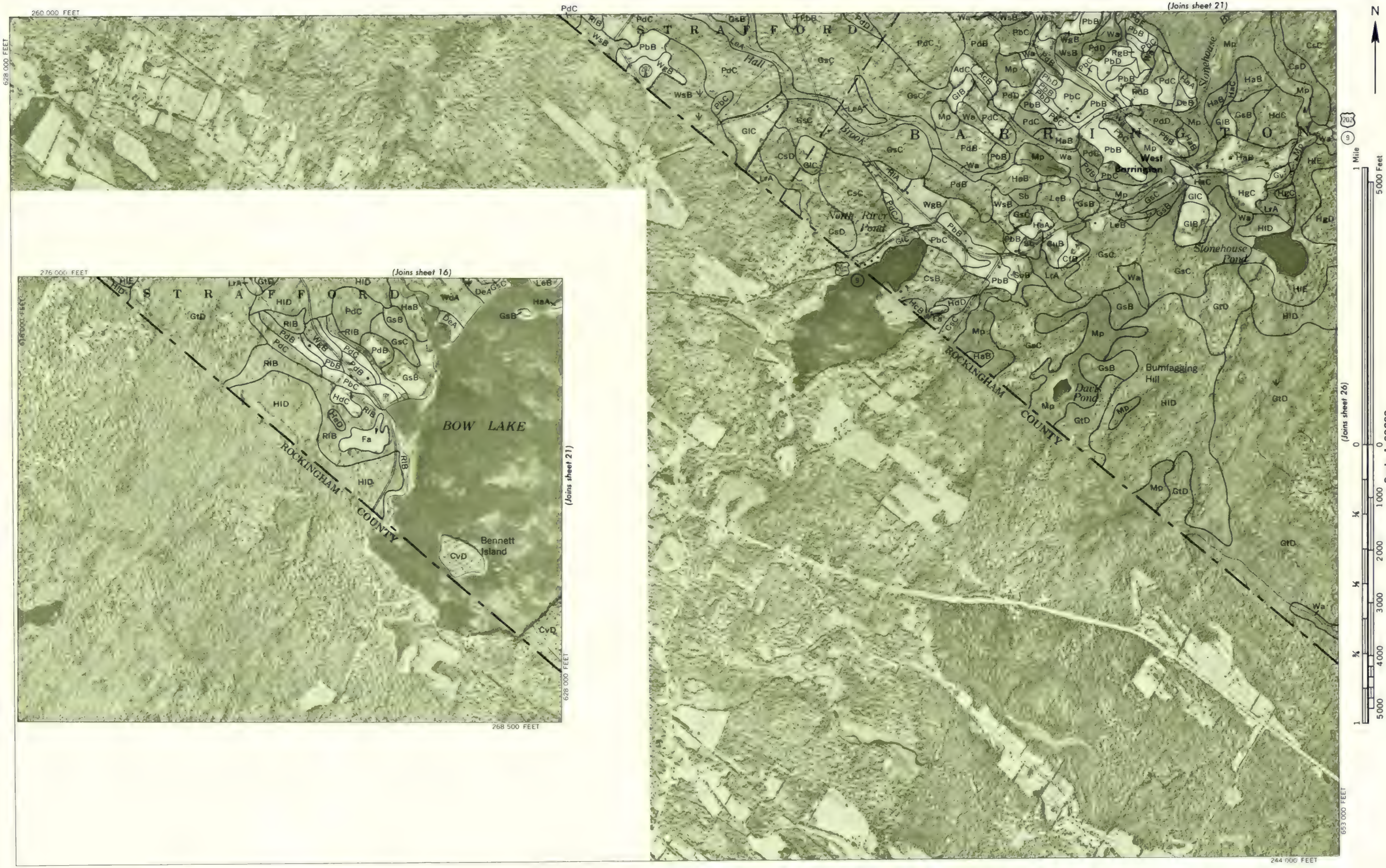

N
(Joins inset, sheet 15)
292 000 FEET
728 000 FEET
(Joins sheet 19)
Scale 1:20000
1 Mile
5000 Feet
703 000 FEET
276 000 FEET
(Joins sheet 24)
SALMON FALLS RIVER
BOSTON AND MAINE
Lily Pond
S O M E R S W O R T H
SOMERSWORTH
YORK COUNTY
MAINE
Tates Brook

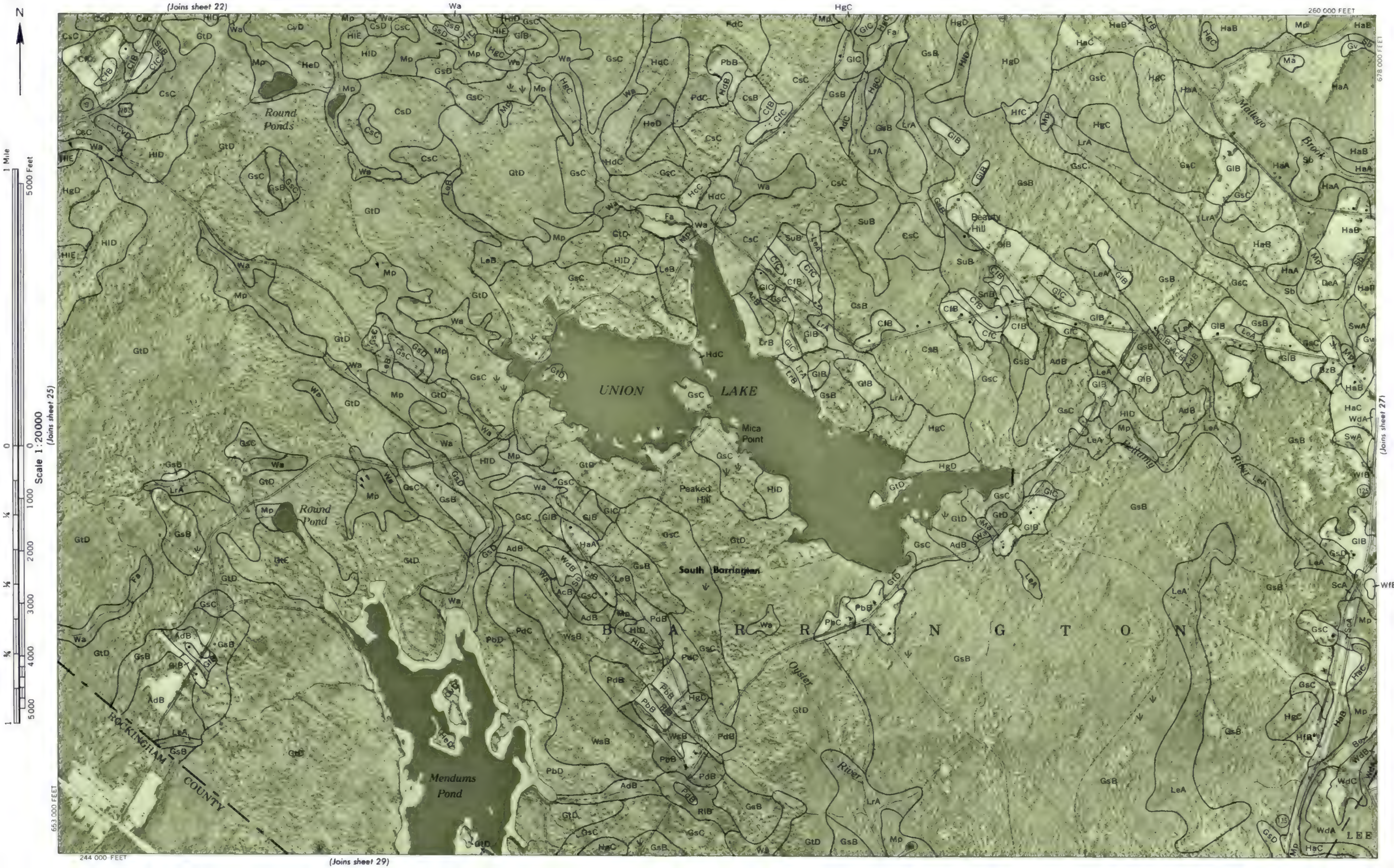

(Joins sheet 17)
(Joins sheet 25)
(Joins sheet 22)
(Joins inset, sheet 25)
276 000 FEET
628 000 FEET
653 000 FEET
260 000 FEET
BOW LAKE
Beech Island
Bow Lake Village
Caverly Hill
Spruce Ponds
Oak Hill
Isinglass River
Spruce Brook
Stonehouse Brook
ROCKINGHAM COUNTY
S T R A F F O R D
B A R R I N G T O N
N
1 Mile
5000 Feet
Scale 1:20000

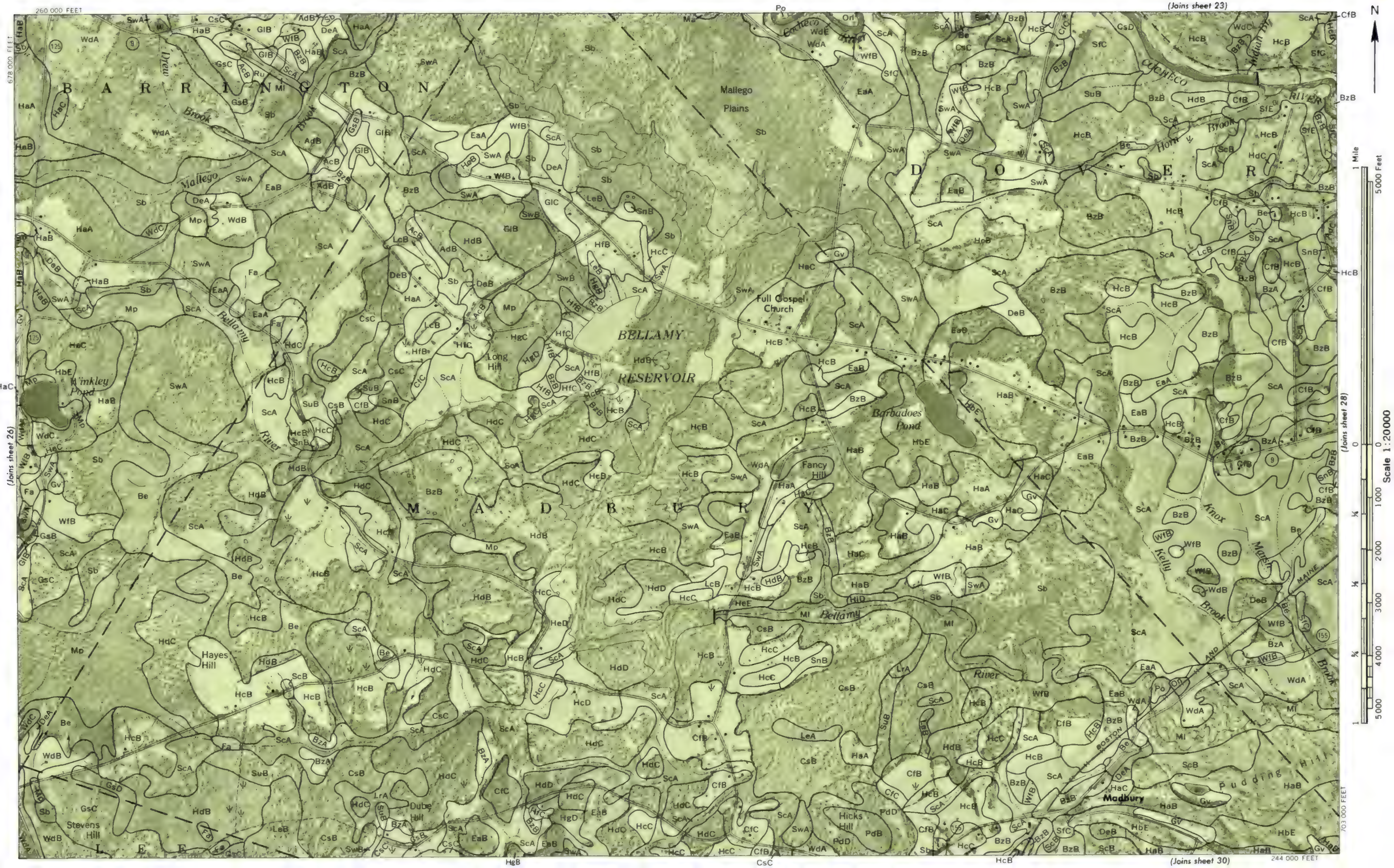

(Joins sheet 18)
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 26)
N
1 Mile
5000 Feet
Scale 1:20000
276 000 FEET
260 000 FEET
STRAFFORD
ROCHESTER
Long Pond
Ayers Pond
ISINGLASS
RIVER
Cates Pond
Berrys Hill
B A R R I N G T O N
Huckleberry Hill
Sunnyside Hill
Mt Misery
Nippo Pond
Nippo Hill
Barrington
Sunnyside School
East Barrington


(Joins sheet 19)
(Joins sheet 22)
(Joins sheet 24)
(Joins sheet 27)
276 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
ROCHESTER
SOMERSWORTH
BARRINGTON
DOVER
MADBURY
Pickering
Blackwater
Blackwater Hill
Long Hill
Cocheco
Clark Brook
Blackwater Brook
Hill Brook
Green Hill
Rochester Neck
The Heppers
County Farm
Sunken Island
East Barrington
Wentworth Brook
Caley Brook
Reyners Brook
Indian Brook
Jackson Brook
Spaulding Turnpike
Cocheco River
Isinglass River

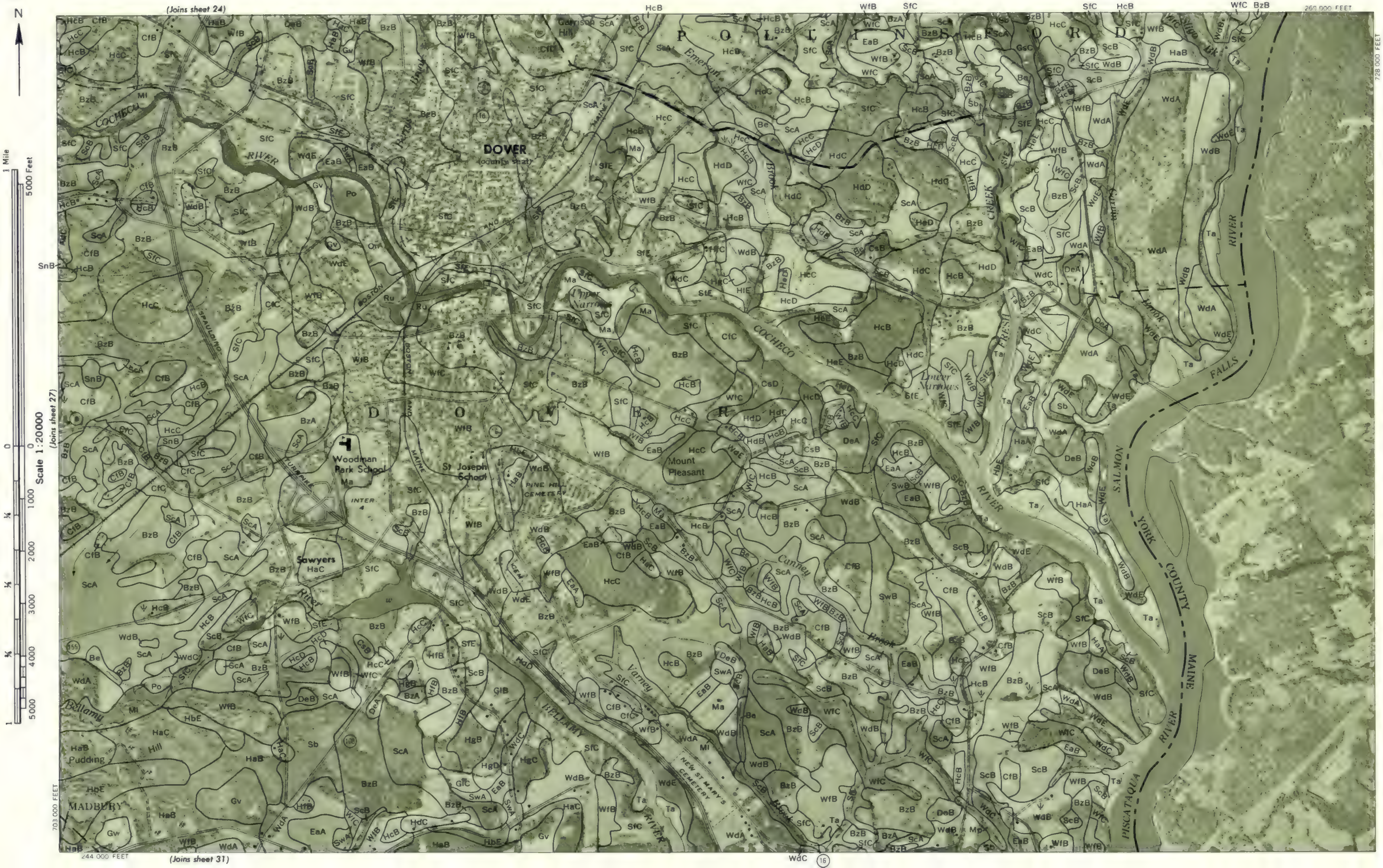

N
(Joins sheet 20)
(Joins sheet 23)
(Joins sheet 28)
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000
276 000 FEET
728 000 FEET
260 000 FEET
703 000 FEET
SOMERSWORTH
S O M E R S W O R T H
Foundry
Indigo Hill
Central Park
Willand Pond
Kelwyn Park
Gates Corner
Fletcher Hill
Salmon Falls
R O L L I N S F O R D
D O V E R
DOVER
(county seat)
INTERCHANGE 5
YORK
COUNTY
MAINE
RIVER
SALMON
FALLS
Peters
Marsh
Brook
Rollins
Brook
Twombly
Brook
Fresh
Creek
Sligo
Creek
BOSTON
MAINE
AND
TURNPIKE
SPAULDING
CEM
DUMP

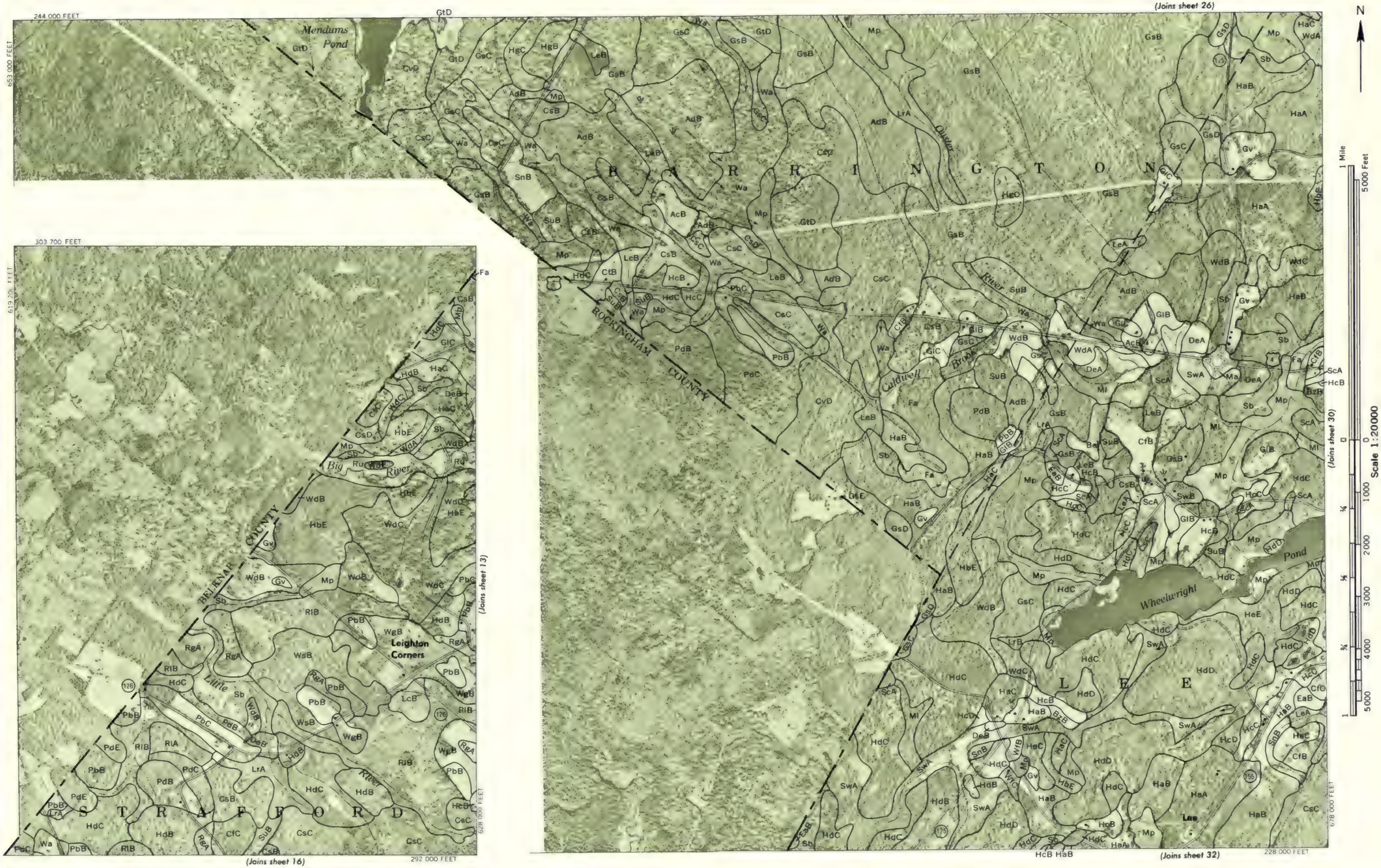

260 000 FEET
628 000 FEET
(Joins sheet 21)
STRAFFORD
BARRINGTON
Hall Brook
North River Pond
West Barrington
Stonehouse Pond
Stonehouse Brook
Bumfagging Hill
Dack Pond
ROCKINGHAM COUNTY
(Joins sheet 26)
653 000 FEET
244 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
276 000 FEET
(Joins sheet 16)
BOW LAKE
Bennett Island
(Joins sheet 21)
628 000 FEET
268 500 FEET


N
(Joins sheet 22)
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 29)
260 000 FEET
678 000 FEET
653 000 FEET
244 000 FEET
1 Mile
5000 Feet
Scale 1:20000
Round Ponds
Round Pond
UNION LAKE
Mica Point
Peaked Hill
Beauty Hill
South Barrington
B A R R I N G T O N
Mallego Brook
Bellamy River
Oyster River
Mendums Pond
ROCKINGHAM COUNTY
LEE


260 000 FEET
678 000 FEET
(Joins sheet 23)
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 30)
703 000 FEET
244 000 FEET
N
1 Mile
5000 Feet
Scale 1:20000
BARRINGTON
DOVER
MADBURY
LEE
Mallego Plains
Mallego
Drew Brook
Bellamy River
BELLAMY RESERVOIR
Full Gospel Church
Long Hill
Kinkley Pond
Barbadoes Pond
Fancy Hill
Hayes Hill
Stevens Hill
Dube Hill
Hicks Hill
Madbury
Pudding Hill
Knox Marsh
Kelly Brook
Cocheco River
Indian Brook
Horn Brook
BOSTON AND MAINE

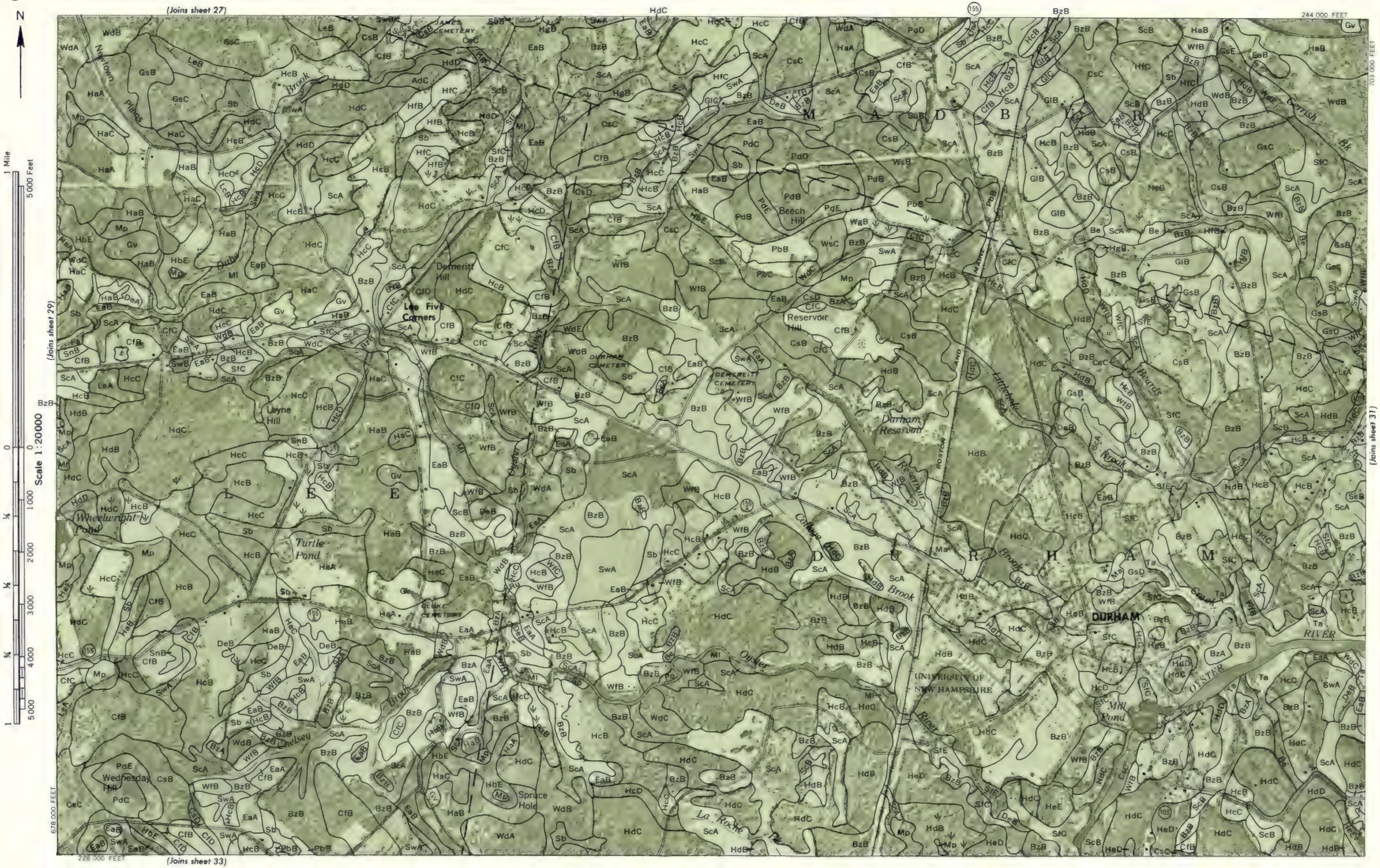
STRAFFORD COUNTY, NEW HAMPSHIRE — SHEET NUMBER 28

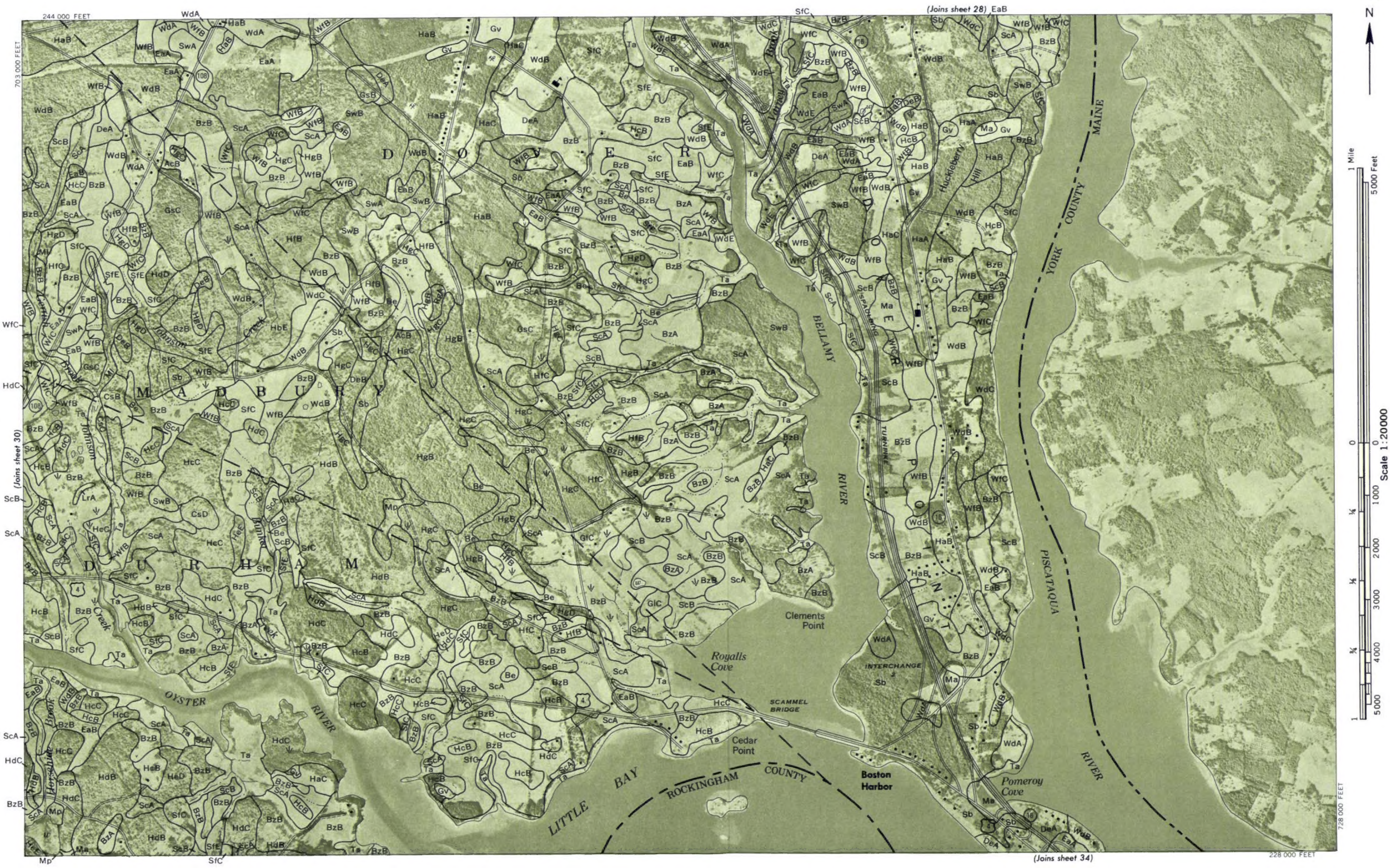


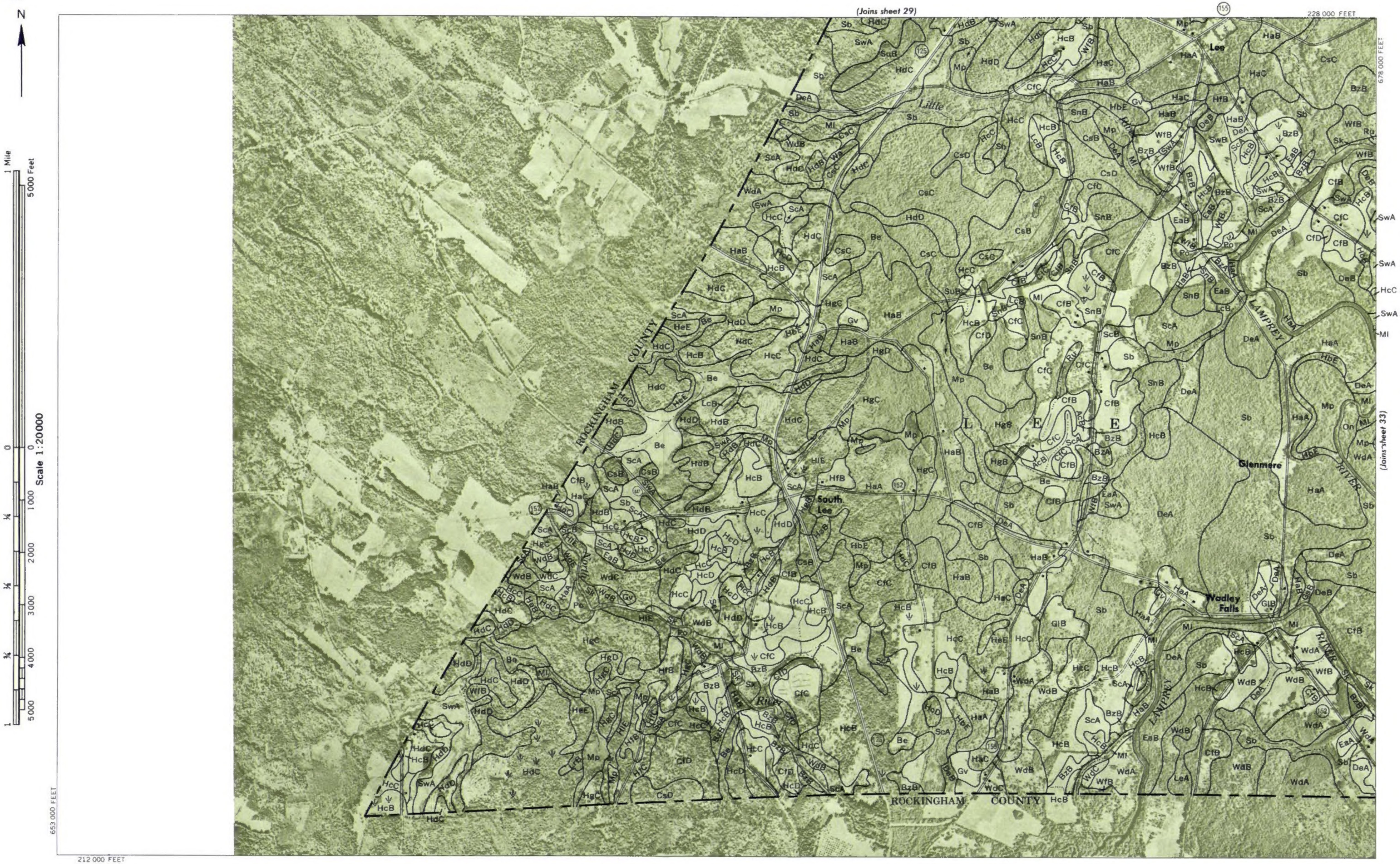

29
N
(Joins sheet 26)
244 000 FEET
653 000 FEET
Mendums Pond
B A R R I N G T O N
Oyster River
Caldwell Brook
ROCKINGHAM COUNTY
303 700 FEET
619 20_ FEET
Big River
BELKNAP COUNTY
Leighton Corners
Little River
S T R A F F O R D
(Joins sheet 13)
628 000 FEET
(Joins sheet 16)
292 000 FEET
Wheelwright Pond
L E E
Lee
(Joins sheet 30)
(Joins sheet 32)
228 000 FEET
678 000 FEET
1 Mile
5000 Feet
Scale 1:20000

30

STRAFFORD COUNTY, NEW HAMPSHIRE — SHEET NUMBER 30




31
N
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 34)
244 000 FEET
703 000 FEET
728 000 FEET
228 000 FEET
DOVER
MADBURY
DURHAM
DOVER POINT
BELLAMY RIVER
PISCATAQUA RIVER
OYSTER RIVER
LITTLE BAY
YORK COUNTY
MAINE
ROCKINGHAM COUNTY
Clements Point
Royalls Cove
Cedar Point
Boston Harbor
Pomeroy Cove
SCAMMEL BRIDGE
INTERCHANGE
Huckleberry Hill
Johnson Creek
Scale 1:20000
1 Mile
5000 Feet



N
(Joins sheet 29)
(Joins sheet 33)
228 000 FEET
678 000 FEET
653 000 FEET
212 000 FEET
1 Mile
5000 Feet
Scale 1:20000
0
1000
2000
3000
4000
5000
Lee
South Lee
Glenmere
Wadley Falls
L E E
ROCKINGHAM COUNTY
LAMPREY RIVER
Little River
155
125
152

N
(Joins sheet 30)
(Joins sheet 32)
(Joins sheet 34)
228 000 FEET
678 000 FEET
703 000 FEET
212 000 FEET
L E E
D U R H A M
ROCKINGHAM COUNTY
LAMPREY RIVER
OYSTER RIVER
Woodman Brook
Beard's Brook
Hamel Brook
Beaudette Brook
Ellison Brook
College Brook
Follett's Brook
Packers Falls
Moat Island
Long Hill
BOSTON AND MAINE
Scale 1:20000
1 Mile
5000 Feet
0
1000
2000
3000
4000
5000


N
(Joins sheet 31)
(Joins sheet 33)
Scale 1:20000
1 Mile
5000 Feet
0 1000 2000 3000 4000 5000
0 ¼ ½ ¾ 1
Durham Point
Dover Point
GENERAL SULLIVAN BRIDGE
YORK CO ME
ROCKINGHAM COUNTY
MATHES CEMETERY
Little Bay
D U R H A M
Crommet Creek
Adams Point
Furber Strait
Footman Islands
228 000 FEET
728 000 FEET
703 000 FEET
212 000 FEET